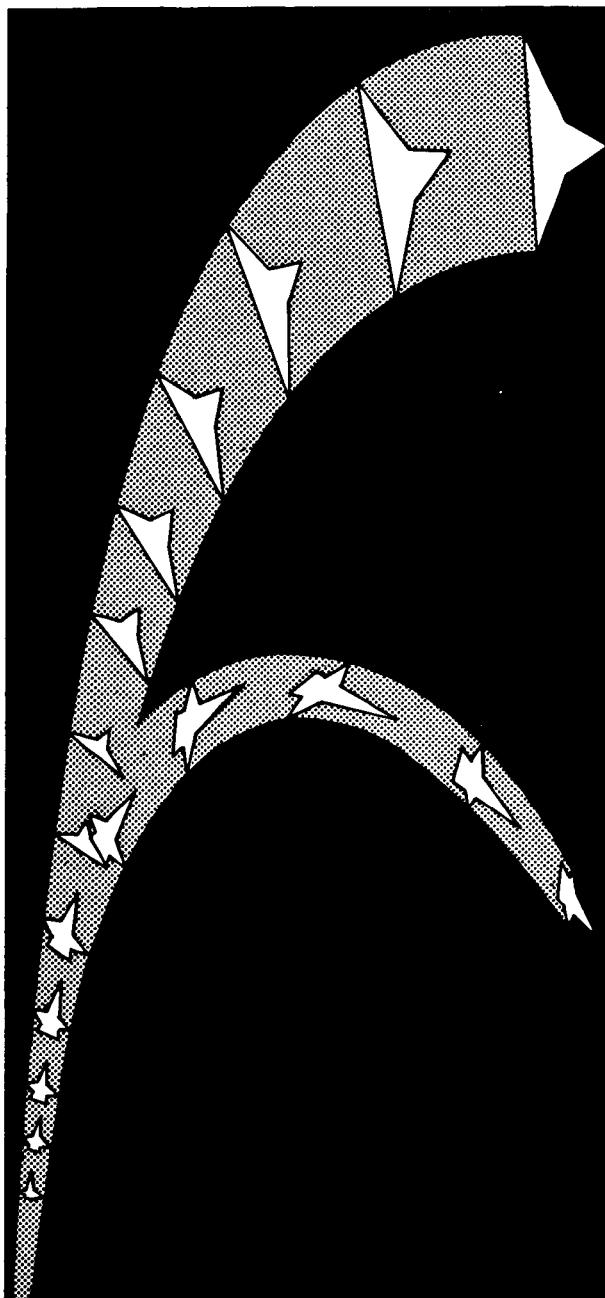


DMS-DR-1158
NASA CR-120,002
NOVEMBER, 1971

CR-120002



—SPACE SHUTTLE—
STATIC STABILITY
CHARACTERISTICS AND
CONTROL SURFACE EFFECTIVENESS
OF THE BOEING .00435 SCALE
MODEL SPACE SHUTTLE BOOSTER
H-32

by
Jacque Houser, TBC
Wm. H. Runciman ,TBC



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SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER
N72-12879

SPACE
Unclas
09330

SPACE SHUTTLE: STATIC
STABILITY CHARACTERISTICS AND CONTROL
SURFACE EFFECTIVENESS OF THE BOEING .00435
SCALE MODEL SPACE J.F. Houser, et al
(Chrysler Corp.) Nov. 1971 121 p CSCL 22B G3/31

SADSAC/SPACE SHUTTLE

WIND TUNNEL TEST DATA REPORT

CONFIGURATION: Boeing .00435 Scale Model Space Shuttle Booster H-32TEST PURPOSE: To Determine Static Stability Characteristics and Control
Surface EffectivenessTEST FACILITY: Grumman 36-Inch Hypersonic Wind TunnelTESTING AGENCY: The Boeing CompanyTEST NO. & DATE: GHWT-020; 6/1/71 through 6/18/71FACILITY COORDINATOR: Mr. Mike Quan - GACPROJECT ENGINEER(S): Mr. Jacque Houser - TBC
Mr. Wm. H. Runciman - TBC

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CONTRACT NAS 8-4016

AMENDMENT 153

DRL 184-58

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ABSTRACT

Experimental aerodynamic investigations were made in the Grumman Aerospace Corp. 36" Hypersonic Wind Tunnel on a .00435 scale model of the H-32 Re-usable Space Shuttle Booster. The objectives of the test were to determine the static stability characteristics and control surface effectiveness at hypersonic speeds. Data were taken at $M = 8.12$ over a range of angles of attack between -5° and 85° at $\beta = 0^\circ$ and over a range of side slip angles between -10° and 10° at $\alpha = 0^\circ$ and 70° . Six component balance data and base-cavity pressure data were recorded.

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TABLE OF CONTENTS

	<u>PAGE NUMBER</u>
LIST OF FIGURES AND TABLES	2
CONFIGURATIONS INVESTIGATED	3
DATASET COLLATIONS	5
TEST FACILITY DESCRIPTION	7
TEST CONDITIONS	8
DATA REDUCTION	11
SUMMARY DATA PLOT INDEX	12
FIGURES	14
MODEL COMPONENT DESCRIPTION SHEETS	22
NOMENCLATURE	37
TABULATED DATA LISTING	42
PLOTTED DATA	43

LIST OF FIGURES

<u>FIGURE NUMBER</u>	<u>TITLE</u>	<u>PAGE NUMBER</u>
1.	Model Assembly, Booster H-32	15
2.	Model Mounting System	16
3.	Model Body Configurations	17
4.	Booster Wing	18
5.	Booster Horizontal Tail	19
6.	Booster Vertical Tail	20
7.	Axis System	21

LIST OF TABLES

<u>TABLE NUMBER</u>	<u>TITLE</u>	<u>PAGE NUMBER</u>
I	Test Conditions	10
II	SADSAC Nomenclature of Aerodynamic Coefficients	

CONFIGURATIONS INVESTIGATED

Model Components Tested;

- B₅ - B₆ with upturned nose; no cab.
- B₆ - Basic booster body with axisymmetrical nose for high-angle testing. 55° sting adaptor coming out through top of body in place of vertical tail. After body complete with simulated thruster nozzles.
- B₇ - B₆ with slab sides and bottom aft of the wing.
- B₈ - Basic booster body with axisymmetrical nose for low-angle testing. Straight sting coming out base of body.
- B₉ - B₆ with droop nose; no cab.
- B₁₁ - B₈ with up-turned nose; no cab.
- B₁₂ - B₈ with droop nose; no cab.
- W₄ - Basic wing configuration with 4° dihedral.
- W₅ - W₄ moved aft 2% of body length.
- W₆ - W₄ with 6° dihedral angle.
- W₇ - W₃ with 8° dihedral angle.
- H₄ - Basic horizontal tail with elevator.
- H₅ - H₄ with elevator removed.
- V₃ - Basic vertical tail without rudder.

Model Component Combinations Tested;

B ₅ W ₅ H ₄	B ₈ V ₃
B ₆	B ₈ W ₄ V ₃
B ₆ W ₄	B ₈ H ₄ V ₃
B ₆ W ₄ H ₄	B ₈ W ₄ H ₄ V ₃
B ₆ W ₅ H ₅	B ₈ W ₅ H ₄ V ₃
B ₆ W ₅ H ₅	B ₈ W ₆ H ₄ V ₃
B ₆ W ₆ H ₄	B ₈ W ₇ H ₄ V ₃

CONFIGURATIONS INVESTIGATED
(CONTINUED)

Model Component Combinations Tested (Con't):

B₆W₇H₄

B₉W₅H₄

B₇W₅H₄

B₁₁W₄H₄V₃

B₈

B₁₂W₄H₄V₃

B₈W₄

Control Surface Deflections Tested:

Horizontal Tail -

The incidence of the horizontal tail was set to -30°, -15°, and 0° with respect to the body centerline.

Elevator -

The elevator was set to -30°, -15°, and 0° with respect to the horizontal tail chord plane.

Sketches of the components are shown in Figures 3 through 6.

Pertinent dimensional information for each of the components tested is given in the "Model Component Description Sheets" which follow the figures.

TEST GAC HST-020 DATA SET COLLATION SHEET

5

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.	PARAMETERS/VALUES		NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)										
			α	B		S_s	S_e									
RCX011	B6	A	0°	-	-											5
021	B6W4	T	-	-												6
031	<u>B6W4H4</u>		0°	0°												13
041		T	0°	-15°												14
061			-15°	-30°												9
071			-15°	-15°												8
081			-15°	0°												7
091			-30°	0°												12
101			-30°	-15°												11
111		Y	-30°	-30°												10
131	B6W5H4		-15°	0°												15
311	B6W5H5		-15°	-												17
321	B5W5H4		-15°	0°												18
301	B9W5H4		-15°	0°												16
181	B7W5H4	T	-15°	0°												19
013	B6	70° C	-	-												22
023	B6W4	T	-	-												21
083	B6W4H4		-15°	0°												20
143	B6W6H4		-15°	0°												23
153	B6W7H4	V	-15°	0°												24

1	7	13	19	25	31	37	43	49	55	61	67	75	76		
CN	CAF	CY	CLM	CBL	FLN	CDF	CL	CAB						IDPVAR(1)	IDPVAR(2) NDV

COEFFICIENTS: $d_A; +40^\circ \text{ to } +85^\circ$

a or b SCHEDULES $d_B; -5^\circ \text{ to } +30^\circ$

$S_C; -10^\circ \text{ to } +10^\circ$

TEST GAC HST 020 DATA SET COLLATION SHEET

PRETEST
 POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.	PARAMETERS/VALUES		NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)									
			α	β		δ_s	δ_e								
RCX 192	B8 V3	B	0°	-	-										
202	B8 W4 V3	T	T	-	-										
222	B8 W4 H4 V3			-15°	0°										
232	B8 W4 H4 V3			0°	0°										
272	B8 H4 V3			-15°	0°										
332	B8 W4 H4 V3			-15°	-15°										
342	B8 W5 H4 V3			-15°	0°										
352	B12 W4 H4 V3			-15°	0°										
362	B11 W4 H4 V3			-15°	0°										
284	B8	0°	C	-	-										
294	B8 W4	T	T	-	-										
204	B8 W4 V3			-	-										
224	B8 W4 H4 V3			-15°	0°										
374	B8 W6 H4 V3			-15°	0°										
384	B8 W7 H4 V3			-15°	0°										

1 7 13 19 25 31 37 43 49 55 61 67 75 76

COEFFICIENTS:

 α ; +40° to +85° \rightarrow IDPVAR(1) | IDPVAR(2) | NDV α or β
SCHEDULES β_R ; -5° to +30° β_c ; -10° to +10°

TEST FACILITY DESCRIPTION

GRUMMAN 36-INCH HYPERSONIC TUNNEL

DESCRIPTION: This is an intermittent blowdown to vacuum type tunnel. The test section is 36 inches in diameter. High temperature air from a pebble bed heater is introduced to the test section through fixed contoured, axisymmetric nozzles.

PERFORMANCE PARAMETERS:

Mach Range:	8, 10, 14
Reynolds Number ($\times 10^6$ /ft):	0.2 to 4.5
Stagnation Pressure (psia):	200 to 2200
Dynamic Pressure (psf):	100 to 1200
Stagnation Temperature ($^{\circ}$ R):	1000 to 3500
Run Time (sec):	30 to 60

TESTING CAPABILITIES: Model mounting consists of a water-cooled, sting-balance sector rig which features a model injection system. Instrumentation for force, pressure, and heat transfer measurement is provided. A Schlieren system is available.

TEST CONDITIONS

The model was sting mounted by two different modes depending upon the range of angles of attack covered. For angles between -5° and 30° a conventional sting coming in the base of the model was used. At the higher angles of attack a sting entering the top of the body in the region normally occupied by the vertical tail was used. Force data were acquired by a $3/4"$ diameter Task Mk XLIII balance.

Yaw runs were made at $\alpha = 0^{\circ}$ and 70° by rolling the sting and model 90° and yawing the model in the tunnel pitch plane.

Base pressures were measured only on the low $-\alpha$ mounting configuration and cavity pressures only on the high $-\alpha$ mounting configuration. Base pressure corrections were applied to the axial force coefficient and cavity pressure corrections were applied to the normal force and pitching moment coefficients. All of the coefficients in the stability axes system reflect the base and cavity pressure corrections.

Schlieren photographs were taken on each run.

Configuration changes were accomplished through the use of interchangeable nose and afterbody sections, wing dihedral blocks, and preformed body fairings to produce the slab-sided body B₇.

Trip strips were not used on the model to fix or originate transition. However, the model was subjected to particle impingement from the pebble-bed heater which

TEST CONDITIONS
(Continued)

caused serious deterioration of the model surface during a run. The damage to the model surface was especially severe at high angles of attack. The model surface was smoothed after each run by light filing or rubbing with emery cloth as required, but no effort was made to fill the depressions formed by the impact of the particles.

Values of the tunnel parameters used in the test program are summarized in Table I.

TABLE I
 TEST CONDITIONS
 TEST GAC-HST-020

MACH NUMBER	NOMINAL REYNOLDS NUMBER per unit length	NOMINAL DYNAMIC PRESSURE (pounds/sq. inch)	NOMINAL STAGNATION TEMPERATURE (degrees Fahrenheit)
8.12	2.9×10^6	3.58	1041

BALANCE UTILIZED: 3/4" DIA. TASK MK XLIII, 6-COMPONENT

CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF <u>400 #</u>	$\pm .8 ^*$	_____
SF <u>200 #</u>	$\pm .4 ^*$	_____
AF <u>80 #</u>	$\pm .16 ^*$	_____
PM <u>600 in-lbs</u>	$\pm 12 \text{ in-lb}$	_____
YM <u>250 in-lbs</u>	$\pm .5 \text{ in-lb}$	_____
RM <u>80 in-lbs</u>	$\pm .16 \text{ in-lb}$	_____

COMMENTS:

Reynolds number was as high as 3.05×10^6 per foot and as low as 2.71×10^6 per foot but never changed by more than about 1.7% in any run.

DATA REDUCTION

The six-component aerodynamic forces and moments measured during the tests have been reduced to coefficient form using the following reference values:

$$S_{REF} = \text{reference wing area} = 13.344 \text{ in}^2$$

$$l_{REF} = \bar{c} = \text{wing mean aerodynamic chord} = 1.468 \text{ inches}$$

$$b_{REF} = \text{wing span} = 9.652 \text{ inches}$$

$$A_b = \text{base area} = 2.432 \text{ in}^2$$

Moments are reduced about a reference c.g. location which is located at model station 7.812 on water line 1.587 and buttline 0.0 (see Figure 1).

High $-a$ runs have corrections applied to the normal force (NF) and pitching moment (PM) balance readings to account for the pressure in the cavity around the end of the dog-leg sting. As a consequence of correcting the NF, CL and CD for the high $-a$ runs are compensated for cavity pressures.

$$(\Delta NF)_c \text{ due to cavity press} = (p_t - p_c)(.891)$$

$$\text{NF corrected} = \text{NF read} - (\Delta NF)_c$$

$$(\Delta PM)_c = -2.683 (\Delta NF)_c$$

$$\text{PM corrected} = \text{PM read} - (\Delta PM)_c$$

Low $-a$ runs have an increment applied to the axial force (AF) balance reading to express the axial force as though free stream static pressure were acting on the base of the model. As a consequence of this operation on AF, C_L and C_D are also for a model with free stream static pressure acting on the base.

SUMMARY DATA PLOT INDEX

TITLE	PLOTTED COEFFICIENTS SCHEDULE	CONDITIONS VARYING	PAGES
Model Build-up in Pitch - No Vertical at High Alpha	(A)	Configuration	1-10
Effect of Stabilizer Deflection - No Vertical at High Alpha	(B)	Stabilizer Deflection	11-18
Effect of Elevator Deflection, HTAIL = 0. Deg.- No Vertical at High Alpha	(B)	Elevator Deflection	19-26
Effect of Elevator Deflection, HTAIL =-15. Deg.- No Vertical at High Alpha	(B)	Elevator Deflection	27-34
Effect of Elevator Deflection, HTAIL = -30. Deg.-	(C)	Elevator Deflection	35-41
Effect of Stabilizer Area	(C)	Configuration	42-48
Effect of Wing Fore and Aft Location in Pitch - No Vertical at High Alpha	(B)	Wing Location	49-56
Effect of Nose Shape	(B),(C)	Configuration	57-71
Effect of Aft Body Shape	(B)	Configuration	72-79
Model Build-Up in Yaw, Alpha = 70. Deg.	(D)	Configuration	80-89
Model Build-Up in Yaw, Alpha = 0. Deg.	(E)	Configuration	90-97
Effect of Wing Dihedral in Yaw, Alpha = 70. Deg.	(D)	Configuration	98-107
Effect of Wing Dihedral in Yaw, Alpha = 0. Deg.	(D),(F)	Configuration	108-118

Note: Plotted Coefficients Schedule on following page.

SUMMARY DATA PLOT INDEX
(CONTINUED)

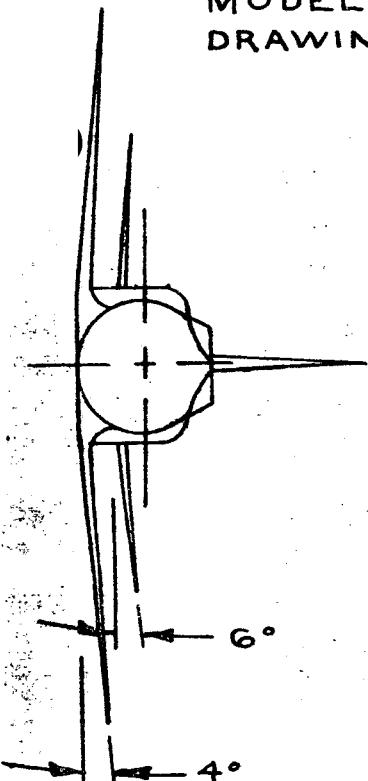
PLOTTED COEFFICIENTS SCHEDULE:

- (A) CL, CDF, CLM, CN, CAF, CDB, CAB vs. α ,
CL vs. CDF, CL vs. CLM, CN vs. CLM
- (B) CL, CDF, CLM, CN, CAF, CDB vs. α ,
CL vs. CLM, CN vs. CLM
- (C) CL, CDF, CLM, CN, CAF vs. α ,
CL vs. CLM, CN vs. CLM
- (D) CY, CLN, CSL, CYN, CBL, CL, CLM, CDF vs. β ,
CY vs. CYN, CY vs. CLN
- (E) CY, CYN, CBL, CL, CLM, CDF, CDB vs. β ,
CY vs. CYN
- (F) CDB vs. β

F I G U R E S

AX - 1205 I - 1

MODEL ASSEMBLY
DRAWING 1205-25



FRONT
VIEW

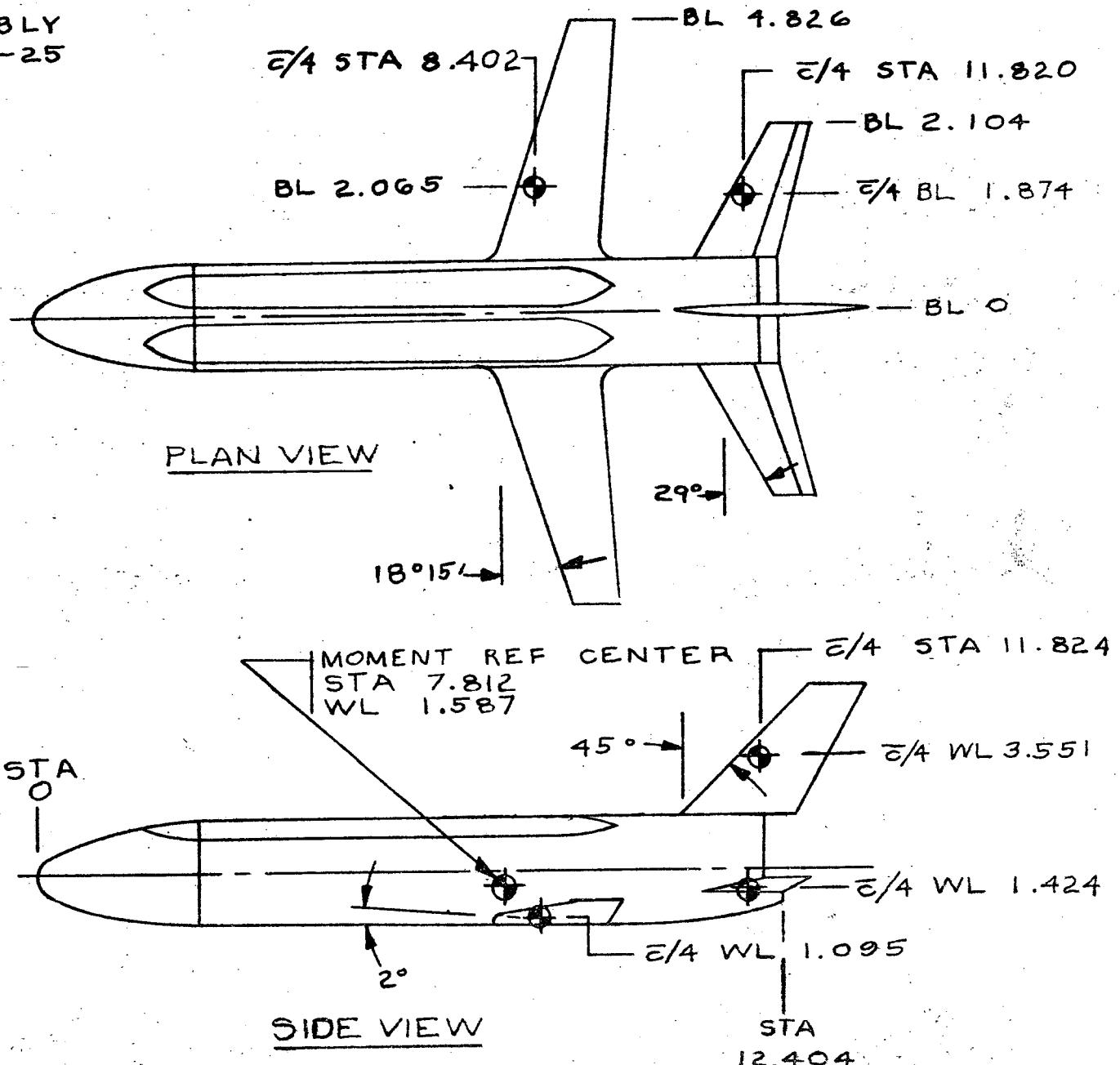


FIGURE 1. Model Assembly, Booster H-32

AX - 1205I-1
MOUNTING SYSTEM

REF: 1205-25, -27

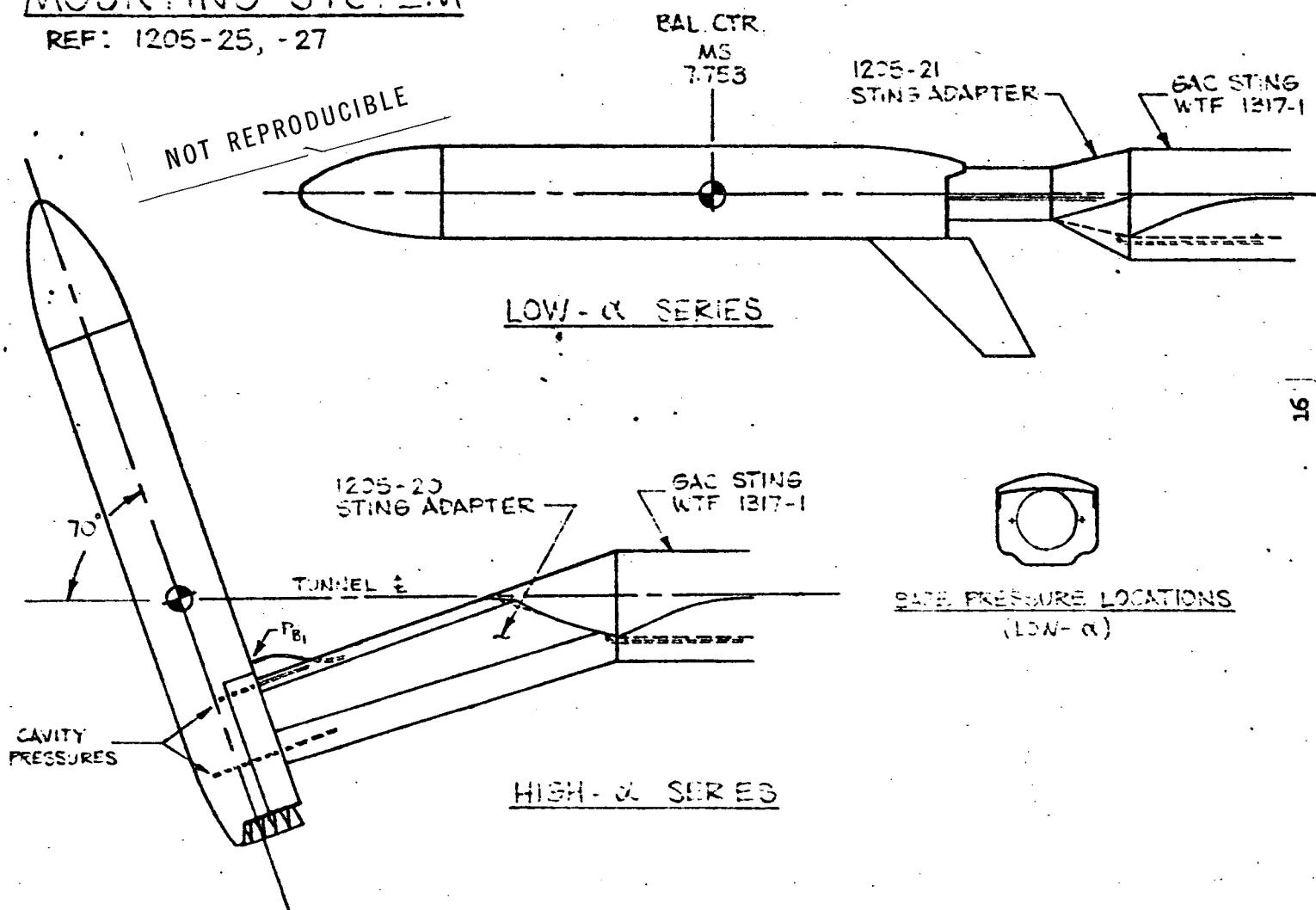


FIGURE 2. MODEL MOUNTING SYSTEM

AX 1205 I-1

BODIES:

REF: 1205-7 NOSE
1205-3 BODY

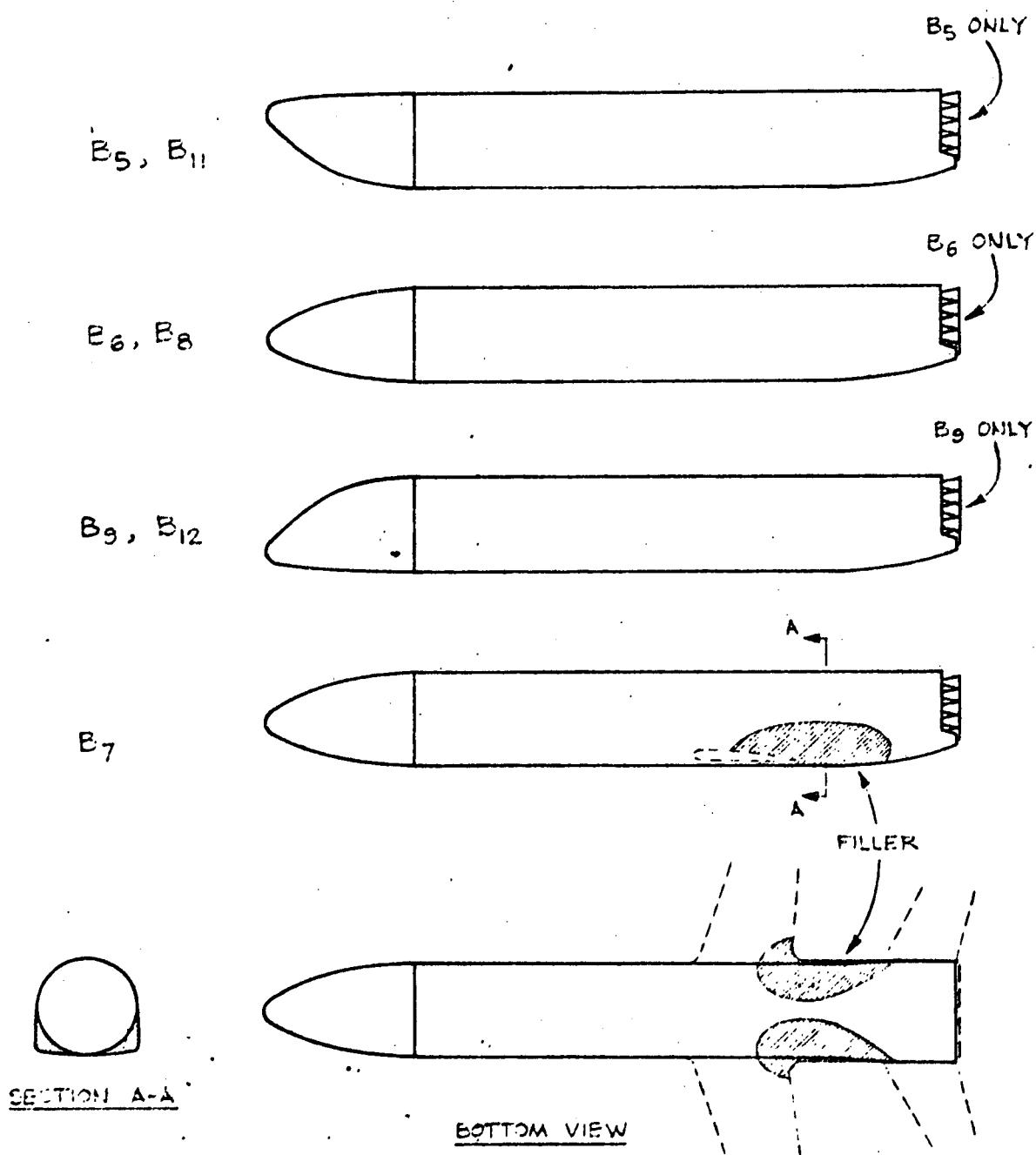


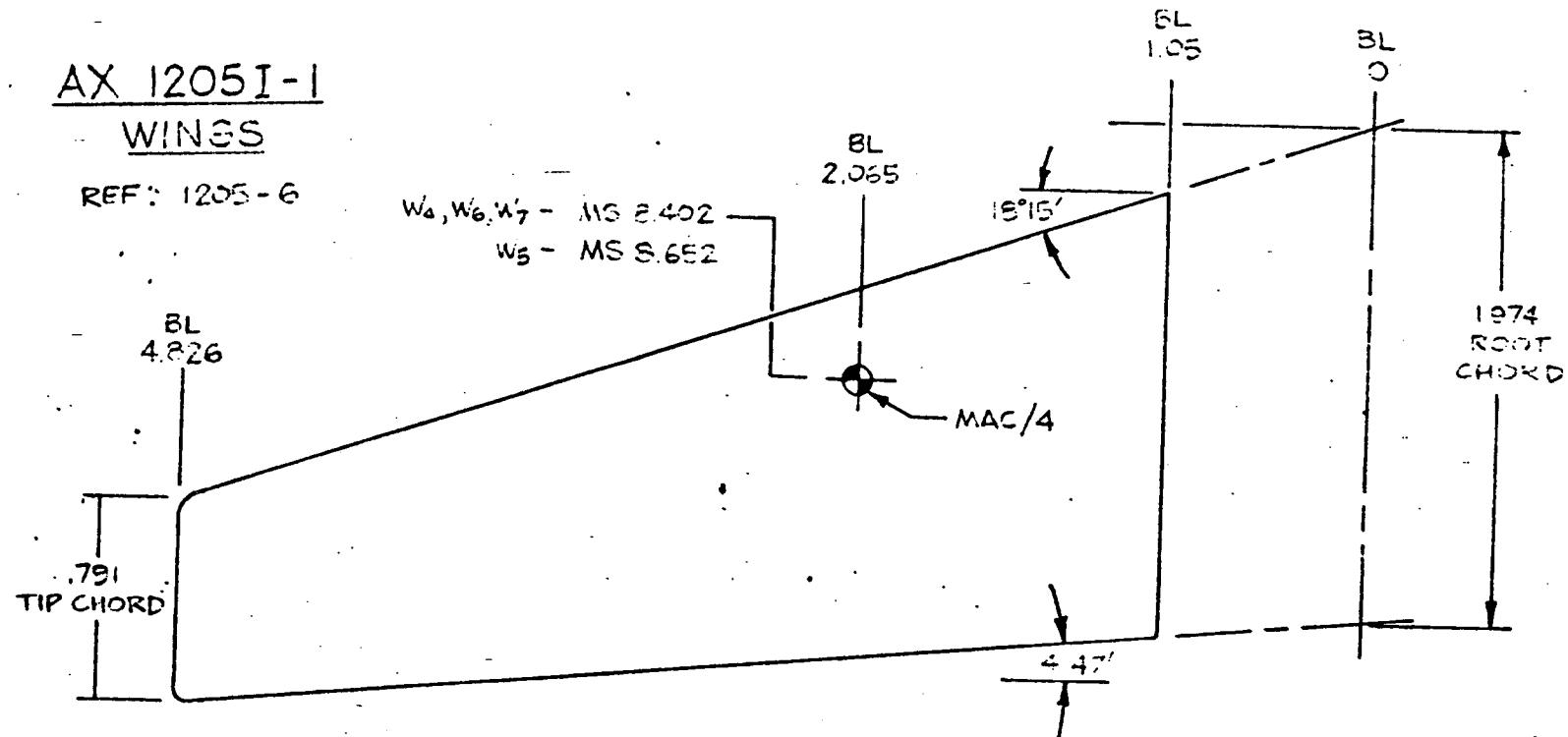
FIGURE 3. MODEL BODY CONFIGURATIONS

AX 1205I-1

WINGS

REF: 1205-6

w_4, w_6, w_7 - MS 2.402
 w_5 - MS S.652



4° - w_4, w_5
 6° - w_6
 8° - w_7

AIRFOIL: NACA 0015-64
MAC = 1.468 IN.
INCIDENCE ANGLE = 2°
(WRT BODY \mathbb{E})

FIGURE 4. BOOSTER WING

AX 1205I-1
HORIZONTAL TAIL
 REF: 1205-10

19

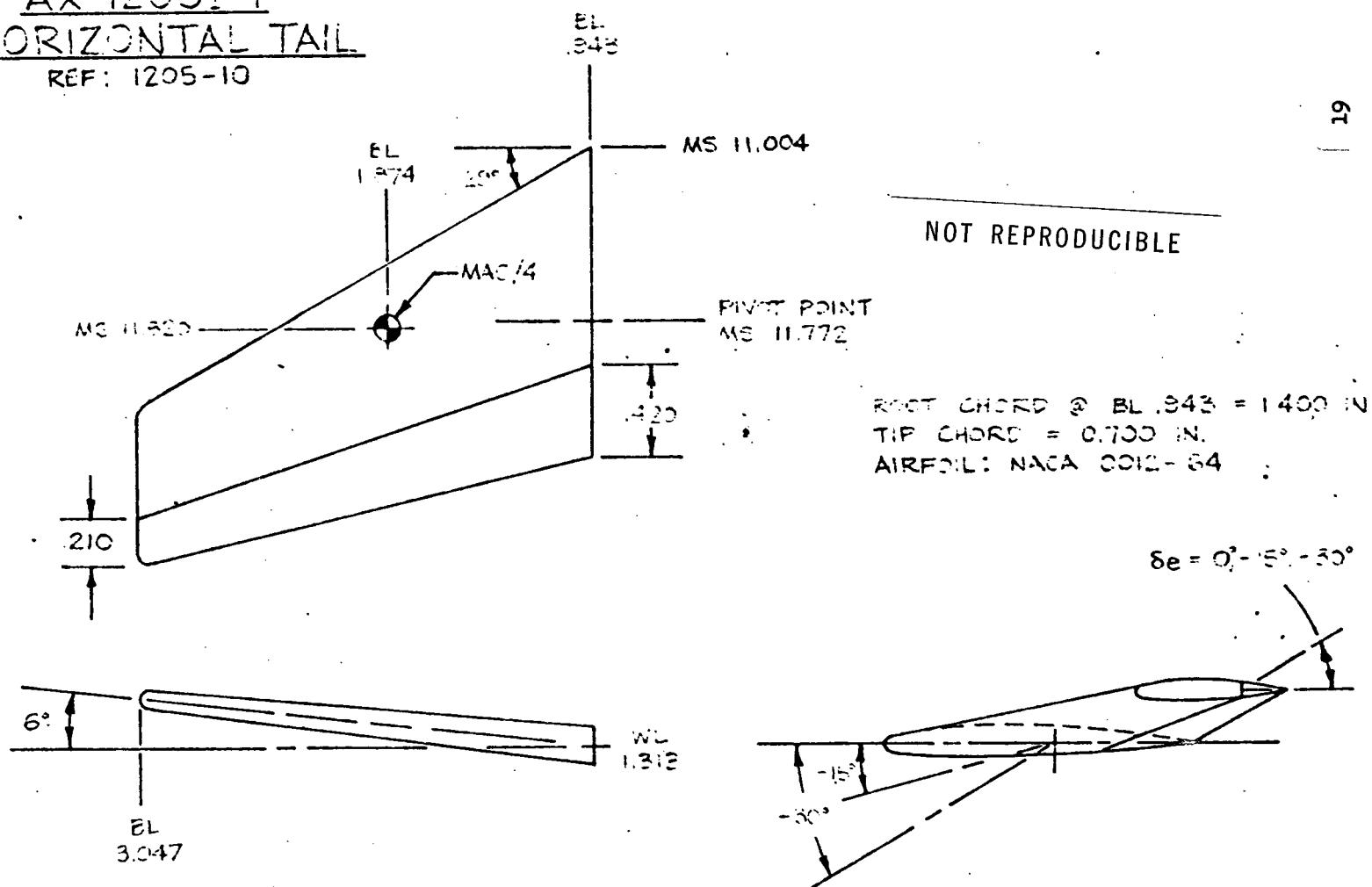
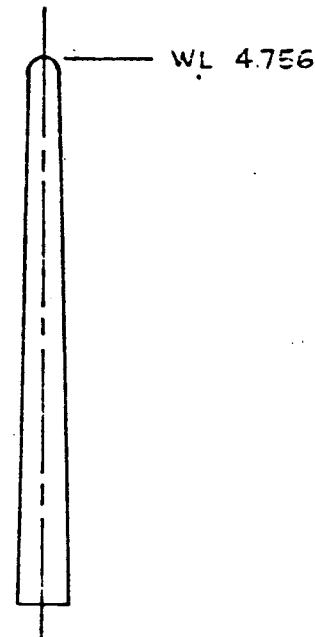
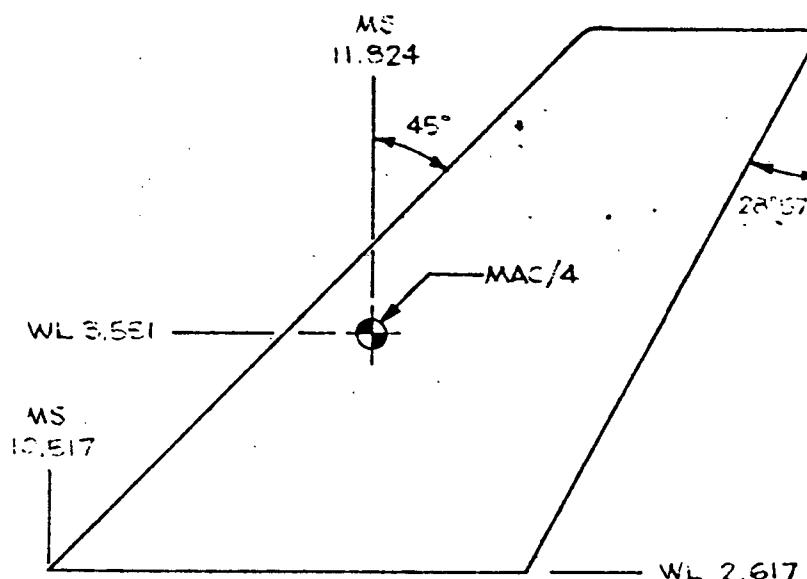


FIGURE 5. BOOSTER HORIZONTAL TAIL

AX 1205 I-I
VERTICAL TAIL
REF: 1202 -I



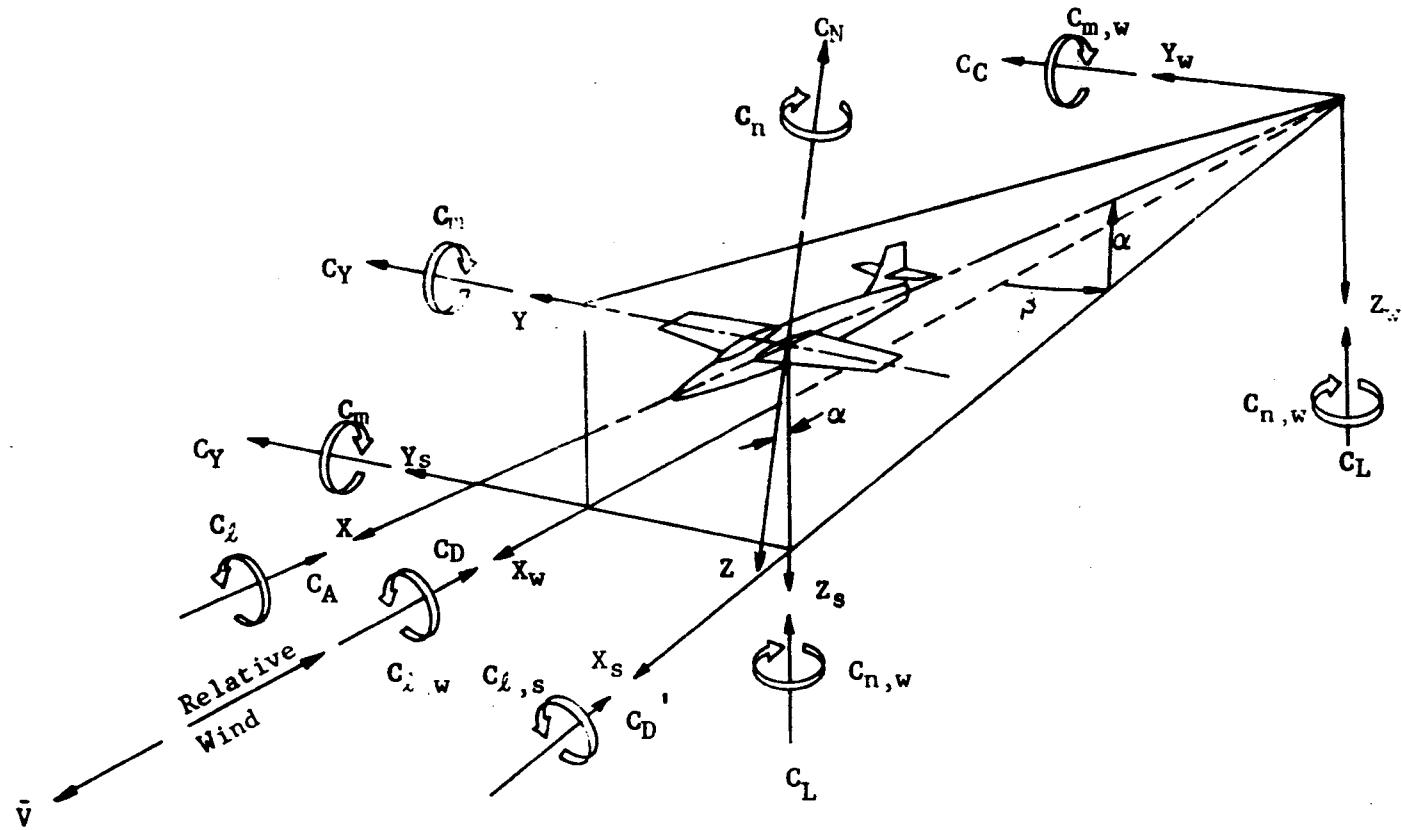
20

RST + RSD = 1.913 IN.
TIP CHORD = 0.957 IN.
AIRFOIL: NACA 0012-64

FIGURE 6. BOOSTER VERTICAL TAIL

Notes:

1. Positive directions of force coefficients moment coefficients, and angles are indicated by arrows.
2. For clarity, origins of wind and stability axes have been displaced from the center of gravity.



21

Figure 1. Axis systems, showing direction and sense of force and moment coefficients, angle of attack, and sideslip angle

MODEL COMPONENT DESCRIPTION SHEETS

MODEL COMPONENT: BODY - B5

GENERAL DESCRIPTION: Body based on the H-32 configuration with up-turned nose, no cab, and sting entering thru the top of the body. Simulated thruster nozzles.

DRAWING NUMBER

Full scale: 164-10060
Model: SP. 1205-27, -7

DIMENSION:

	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length	<u>2853 in</u>	<u>12.404 in</u>
Max Width	<u>434 in</u>	<u>1.88 in</u>
Max Depth	<u>404 in</u>	<u>1.757 in</u>
Fineness Ratio	<u>7.05</u>	<u>7.05</u>
Area		
Max Cross-Sectional	<u>1031 ft²</u>	<u>2.806 in²</u>
Planform	<u> </u>	<u> </u>
Wetted	<u> </u>	<u> </u>
Base	<u>866 ft²</u>	<u>2.432 in²</u>

Balance center is at model 1 B.5, 7.753 , WL 1.739
 Model nose is B5.0, & is WL 1.739
 Full scale nose is B5 1000, & is WL 400

MODEL COMPONENT: BODY - B6

GENERAL DESCRIPTION: Body based on the H-32 configuration with axisymmetric nose and sting entering thru the top of the body. Simulated thruster nozzles.

DRAWING NUMBER	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
<u>DIMENSION:</u>		
Length	<u>2853 in.</u>	<u>12.404 in.</u>
Max Width	<u>434 in.</u>	<u>1.88 in.</u>
Max Depth	<u>404 in.</u>	<u>7.757 in.</u>
Fineness Ratio	<u>7.05</u>	<u>7.05</u>
Area		
Max Cross-Sectional	<u>1031 ft²</u>	<u>2.806 in²</u>
Planform		
Wetted		
Base	<u>866 ft²</u>	<u>2.432 in²</u>

Balance center at model B5 7.753 , WL 1.739

Model nose is B5 0, & is WL 1.739

Full scale nose is B5 1000, & is WL 400

MODEL COMPONENT: BODY — B₇

GENERAL DESCRIPTION: Body based on the 14-32 configuration with axisymmetrical nose, slab sides and bottom aft of the wing, and sting entering thru the top of the body. Simulated thruster nozzles.

Full scale : 164-10060

DRAWING NUMBER

Model : 50.1205-27, -7, -28

<u>DIMENSION:</u>	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length	<u>2853 in.</u>	<u>12,404 in.</u>
Max Width	<u>434 in.</u>	<u>1,88 in.</u>
Max Depth	<u>409 in.</u>	<u>1,757 in.</u>
Fineness Ratio	<u>7.05</u>	<u>7.05</u>
Area		
Max Cross-Sectional	<u>1031 ft²</u>	<u>2.806 in.²</u>
Planform		
Wetted		
Base	<u>866 ft²</u>	<u>2,432 in.²</u>

Balance center is at model B5 7.753 , WL 1.734

Model nose is at B5 0, L is at WL 1.739

Full scale nose is B5 1000, L is at WL 400

MODEL COMPONENT: BODY - B8

GENERAL DESCRIPTION: Body based on the H-32 configuration with axisymmetrical nose and sting entering thru the base of the body.

DRAWING NUMBER Full scale: 164-10060
Model: 50 1205-25,-7

DIMENSION:

	FULL SCALE	MODEL SCALE
Length	2853 in.	12,404 in.
Max Width	434 in.	1.88 in.
Max Depth	404 in.	1,757 in.
Fineness Ratio	7.05	7.05
Area		
Max Cross-Sectional	1031 ft ^{1/2}	2.806 in. ²
Planform		
Wetted		
Base	866 ft ^{1/2}	2.432 in. ²

Balance center is at model B5 7.753, WL 1.739.
 Model nose is at B5 0, & is at WL 1.739.
 Full scale nose is B5 1000, & is at WL 400.

MODEL COMPONENT: BODY B9

GENERAL DESCRIPTION: Body based on the H-32 configuration with droop nose, no cap, and sting entering thru the top of the body. Simulated thruster nozzles.

DRAWING NUMBER : Full scale: 164-10060
Model: 50.1205-27-7

<u>DIMENSION:</u>	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length	<u>285.3 in.</u>	<u>12.404 in.</u>
Max Width	<u>434 in.</u>	<u>1.88 in.</u>
Max Depth	<u>404 in.</u>	<u>1.757 in.</u>
Fineness Ratio	<u>7.05</u>	<u>7.05</u>
Area		
Max Cross-Sectional	<u>1031 ft²</u>	<u>2.806 in.²</u>
Planform		
Wetted		
Base	<u>866 ft²</u>	<u>2.432 in.²</u>

Balance center is at model B5. 7.753, WL 1.734
Model nose is at B5 0, & is at WL 1.734
Full scale nose is at B5 1000, & is at WL 400

MODEL COMPONENT: BODY — B₁₁

GENERAL DESCRIPTION: Body based on the H-32 configuration with turned up nose, no cab, and sting entering thru the base of the body.

DRAWING NUMBER	<u>Full scale: 164-10060</u> <u>Model: SD 1205-25,-7</u>	
<u>DIMENSION:</u>	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length	<u>2853 in</u>	<u>12,404 in.</u>
Max Width	<u>434 in.</u>	<u>1.88 in.</u>
Max Depth	<u>404 in.</u>	<u>1.757 in.</u>
Fineness Ratio	<u>7.05</u>	<u>7.05</u>
Area		
Max Cross-Sectional	<u>1031 ft²</u>	<u>2.806 in.²</u>
Planform	<u> </u>	<u> </u>
Wetted	<u> </u>	<u> </u>
Base	<u>866 ft²</u>	<u>2,432 in.²</u>

Balance center is at model B5 7.753, WL 1.739
 Model nose is at B5 0, & is at WL 1.739
 Full scale nose is at B5 1000, & is at WL 400

MODEL COMPONENT: BODY — B12

GENERAL DESCRIPTION: Body based on the H-32 configuration with droop nose, no cab, and sting entering thru the base of the body.

DRAWING NUMBER Full scale: 164-10060
 Model: 50 1205-25, -7

<u>DIMENSION:</u>	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length	<u>2853 in.</u>	<u>12,404 in.</u>
Max Width	<u>434 in.</u>	<u>1.88 in.</u>
Max Depth	<u>404 in.</u>	<u>1.757 in.</u>
Fineness Ratio	<u>7.05</u>	<u>7.05</u>
Area		
Max Cross-Sectional	<u>1031 ft²</u>	<u>2.806 in.²</u>
Planform		
Wetted		
Base	<u>866 ft²</u>	<u>2,432 in.²</u>

Balance center is at model B5 7.753, WL 1.739
Model nose is B5 0, & is WL 1.739
Full scale nose is at B5 1000, & is at WL 400

MODEL COMPONENT: Wing - W4

GENERAL DESCRIPTION: Wing based on the H-32 configuration
with sweep angle changed.

Full scale: 164-10060

DRAWING NUMBER: Model 1, S.O. 1205-6

DIMENSIONS:

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area

Planform

4900 ft.²

13.344 in.²

Wetted

Span (equivalent)

185 ft.

9.652 in.

Aspect Ratio

7

7

Rate of Taper

0.4

0.4

Taper Ratio

4°

4°

Dihedral Angle, degrees

2°

2°

Incidence Angle, degrees

0°

0°

Aerodynamic Twist, degrees

—

—

Toe-In Angle

—

—

Cant Angle

—

—

Sweep Back Angles, degrees

14°

18° 16'

Leading Edge

0°

40° 47'

Trailing Edge

11°

15°

0.25 Element Line

—

—

Chords:

453 in.

1,974 in.

Root (Wing Sta. 0.0)

181 in.

0.791 in.

Tip, (equivalent)

336 in.

1,466 in.

MAC

2912

8,702

Fus. Sta. of .25 MAC

—

—

W.P. of .25 MAC

—

—

B.L. of .25 MAC

—

—

Airfoil Section

477

2,065

Root

NACA-0015-14

NACA-0015-64

Tip

NACA-0015-64

NACA-0015-64

MAC

—

—

Fus. Sta. of .25 MAC

—

—

W.P. of .25 MAC

—

—

B.L. of .25 MAC

—

—

Full scale nose is at B51000; model nose is at B5, 0.
Full scale Q is at WL 400; model Q is at 1,739

MODEL COMPONENT: Wing - W5

GENERAL DESCRIPTION: Same as W4 except moved
off on body 2% of body length (.25 in)

DRAWING NUMBER: _____

DIMENSIONS: FULL-SCALE MODEL SCALE

TOTAL DATA

Area		
Planform	_____	_____
Wetted	_____	_____
Span (equivalent)	_____	_____
Aspect Ratio	_____	_____
Rate of Taper	_____	_____
Taper Ratio	_____	_____
Diehedral Angle, degrees	_____	_____
Incidence Angle, degrees	_____	_____
Aerodynamic Twist, degrees	_____	_____
Toe-In Angle	_____	_____
Cant Angle	_____	_____
Sweep Back Angles, degrees		
Leading Edge	_____	_____
Trailing Edge	_____	_____
0.25 Element Line	_____	_____
Chords:		
Root (Wing Sta. 0.0)	_____	_____
Tip, (equivalent)	_____	_____
MAC	_____	_____
Fus. Sta. of .25 MAC	_____	_____
W.P. of .25 MAC	_____	_____
B.L. of .25 MAC	_____	_____
Airfoil Section		
Root	_____	_____
Tip	_____	_____

EXPOSED DATA

Area		
Span, (equivalent)	_____	_____
Aspect Ratio	_____	_____
Taper Ratio	_____	_____
Chords		
Root	_____	_____
Tip	_____	_____
MAC	_____	_____
Fus. Sta. of .25 MAC	_____	_____
W.P. of .25 MAC	_____	_____
B.L. of .25 MAC	_____	_____

MODEL COMPONENT: Wing - W6

GENERAL DESCRIPTION: Same as W5 with 6° dihedral angle

DRAWING NUMBER: _____

DIMENSIONS:

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area

Planform

Wetted

Span (equivalent)

Aspect Ratio

Rate of Taper

Taper Ratio

Dihedral Angle, degrees

Incidence Angle, degrees

Aerodynamic Twist, degrees

Toe-In Angle

Cant Angle

Sweep Back Angles, degrees

Leading Edge

Trailing Edge

0.25 Element Line

Chords:

Root (Wing Sta. 0.0)

Tip, (equivalent)

MAC

Fus. Sta. of .25 MAC

W.P. of .25 MAC

B.L. of .25 MAC

Airfoil Section

Root

Tip

EXPOSED DATA

Area

Span, (equivalent)

Aspect Ratio

Taper Ratio

Chords

Root

Tip

MAC

Fus. Sta. of .25 MAC

W.P. of .25 MAC

B.L. of .25 MAC

MODEL COMPONENT: Wing - W7

GENERAL DESCRIPTION: Same as W6 with 8° dihedral angle.

DRAWING NUMBER: _____

DIMENSIONS:

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area

Planform

Wetted

Span (equivalent)

Aspect Ratio

Rate of Taper

Taper Ratio

Dihedral Angle, degrees

Incidence Angle, degrees

Aerodynamic Twist, degrees

Toe-In Angle

Cant Angle

Sweep Back Angles, degrees

Leading Edge

Trailing Edge

0.25 Element Line

Chords:

Root (Wing Sta. 0.0)

Tip, (equivalent)

MAC

Fus. Sta. of .25 MAC

W.P. of .25 MAC

B.L. of .25 MAC

Airfoil Section

Root

Tip

EXPOSED DATA

Area

Span, (equivalent)

Aspect Ratio

Taper Ratio

Chords

Root

Tip

MAC

Fus. Sta. of .25 MAC

W.P. of .25 MAC

B.L. of .25 MAC

MODEL COMPONENT: Horizontal Tail - 1/4

GENERAL DESCRIPTION: Horizontal stabilizer based on the H-32 configuration with adjustable incidence angle and adjustable angle elevator.

Full scale: 164-10060

DRAWING NUMBER: Model: 50.1205-10

DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area (exposed)	<u>1620 ft²</u>	<u>4.418 in.²</u>
Span (equivalent) (exposed)	<u>968 in.</u>	<u>4.208 in.</u>
Inb'd equivalent chord	<u>322 in.</u>	<u>1.40 in.</u>
Outb'd equivalent chord	<u>161 in</u>	<u>0.70 in</u>
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	<u>.297</u>	<u>.30</u>
At Outb'd equiv. chord	<u>.278</u>	<u>.30</u>
Sweep Back Angles, degrees		
Leading Edge	<u>29°</u>	<u>29°</u>
Tailing Edge	<u>12.5°</u>	<u>12.5°</u>
Hingeline	<u>18°</u>	<u>18°</u>
Area Moment (Normal to hinge line)		
MAC	<u>251 in</u>	<u>1.089 in.</u>
B5 $\frac{MAC}{4}$	<u>3719</u>	<u>11.820</u>
Airfoil section	<u>NACA-0012-64</u>	<u>NACA-0012-64</u>

Full scale nose is at B5 1000; model nose is at B5 0
Full scale δ is at WL 400; model δ is at WL 1.739

MODEL COMPONENT: Horizontal Tail - H5

GENERAL DESCRIPTION: H4 with elevator removed.

DRAWING NUMBER: Model 50, 1205-10

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area	_____	<u>3.093 in.²</u>
Span (equivalent) (exposed)	_____	<u>4.208 in.</u>
Inb'd equivalent chord	_____	<u>0.98 in.</u>
Outb'd equivalent chord	_____	<u>0.49 in.</u>
Ratio movable surface chord/ total surface chord	_____	_____
At Inb'd equiv. chord	_____	_____
At Outb'd equiv. chord	_____	_____
Sweep Back Angles, degrees	_____	_____
Leading Edge	_____	<u>29°</u>
Tailing Edge	_____	<u>18°</u>
Hingeline	_____	_____
Area Moment (Normal to hinge line)	_____	_____

MAC

0.762 in.

BS for $\frac{MAC}{4}$

11.713

Full scale nose is at BS 1000, model nose is at BS 0
Full scale ℓ is at WS 400, model ℓ is at WS 1.739

MODEL COMPONENT: Vertical Tail - V3

GENERAL DESCRIPTION: Vertical without rudder based
on the H-32 configuration.

Full scales 1CA-10060

DRAWING NUMBER: Model: S.O.1205-1

DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area	<u>1123-1/4 ft²</u>	<u>3.069 in.²</u>
Span (equivalent)	<u>492 in.</u>	<u>2.139 in.</u>
Inb'd equivalent chord	<u>440 in.</u>	<u>1.913 in.</u>
Outb'd equivalent chord	<u>220 in.</u>	<u>0.957 in.</u>
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	<u>.301</u>	<u>—</u>
At Outb'd equiv. chord	<u>.333</u>	<u>—</u>
Sweep Back Angles, degrees		
Leading Edge	<u>45°</u>	<u>45°</u>
Trailing Edge	<u>19°</u>	<u>19°</u>
Hingeline	<u>34°</u>	<u>—</u>
Area Moment (Normal to hinge line)	<u>—</u>	<u>—</u>
Airfoil section	<u>NACA-0012-64</u>	<u>NACA-0012-64</u>
MAC	<u>344 in.</u>	<u>1.446 in.</u>
B3 MAC	<u>3720</u>	<u>11.825</u>

Full scale nose is at B3 1000; model nose is at B3 0
full scale ℓ is at WL 400; model ℓ is at WL 1739

NOMENCLATURE

(General)

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
α	ALPHA	angle of attack, angle between the projection of the wind X_w -axis on the body X, Z-plane and the body X-axis; degrees
β	BETA	sideslip angle, angle between the wind X_w -axis and the projection of this axis on the body X-Z-plane; degrees
ψ	PSI	yaw angle, angle of rotation about the body Z-axis, positive when the positive X-axis is rotated toward the positive Y-axis; degrees
ϕ	PHI	roll angle, angle of rotation about the body X-axis, positive when the positive Y-axis is rotated toward the positive Z-axis; degrees
ρ		air density; kg/m^3 , slugs/ ft^3
a		speed of sound; m/sec , ft/sec
V		speed of vehicle relative to surrounding atmosphere; m/sec , ft/sec
q	$Q(\text{PSI})$ $Q(\text{PSF})$	dynamic pressure; $1/2\rho V^2$, psi, psf
M	MACH	Mach number; V/a
RN/L	RN/L	Reynolds number per unit length; million/ ft
p		static pressure; psi
P		total pressure; psi
C_p	CP	pressure coefficient; $(p-p_\infty)/q$

NOMENCLATURE (Continued)

Reference & C. G. Definitions

<u>SYMBOL</u>	SADSAC <u>SYMBOL</u>	<u>DEFINITION</u>
S		wing area; m ² , ft ²
S	SREF	reference area; m ² , ft ²
c̄		wing mean aerodynamic chord or reference chord; m, ft, in (see ℓ_{ref} or LREF)
ℓ_{ref}	LREF	reference length; m, ft, in.; (see c̄)
b _{ref}	BREF	wing span or reference span; m, ft, in
A _b		base area; m ² , ft ² , in ²
c. g.		center of gravity
MRP	MRP	abbreviation for moment reference point
	XMRP	abbreviation for moment reference point on X-axis
	YMRP	abbreviation for moment reference point on Y-axis
	ZMRP	abbreviation for moment reference point on Z-axis

NOMENCLATURE (Continued)

Axis System General

<u>SYMBOL</u>	<u>DEFINITION</u>
F	force; F, lbs
M	moment; M, in-lb

<u>Subscript</u>	<u>Definition</u>
N	normal force
A	axial force
L	lift force
D	drag force
Y	force or moment about the Y axis
Z	moment about the Z axis
X	moment about the X axis
s	stability axis system
w	wind axis system
ref	reference conditions
∞	free stream conditions
t	total conditions
b	base

NOMENCLATURE (Continued)
Body & Stability Axis System

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
<u>Body Axis System</u>		
C_N	CN	normal force coefficient; F_N/qS
C_A	CA	axial force coefficient; F_A/qS
C_{A_b}	CAB	base axial force coefficient; $[-1] \left[(p_b - p_\infty)/q \right] (A_b/S)$
C_{A_f}	CAF	forebody axial force coefficient; $C_A - C_{A_b}$
C_n	CYN	yawing moment coefficient; $M_Z/qS b_{ref}$
C_ℓ	CBL	rolling moment coefficient; $M_X/qS b_{ref}$
<u>Common to Both Axis Systems</u>		
C_m	CLM	pitching moment coefficient; $M_Y/qS l_{ref}$
C_y	CY	side force coefficient; F_Y/qS
<u>Stability Axis System</u>		
C_L	CL	lift force coefficient; F_L/qS
C_D	CD	drag force coefficient; F_D/qS
C_{D_b}	CDB	base drag coefficient
C_{D_f}	CDF	forebody drag coefficient; $C_D - C_{D_b}$
C_n	CLN	yawing moment coefficient; $M_{Z,s}/qS b_{ref}$
C_ℓ	CSL	rolling moment coefficient; $M_{X,s}/qS b_{ref}$
L/D	L/D	lift-to-drag ratio; C_L/C_D
L/D_f	L/DF	lift to forebody drag ratio; C_L/C_{D_f}

NOMENCLATURE (Continued)

Surface Definitions

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
i_t	HORIZT	horizontal tail incidence; positive when trailing edge down; degrees
δ		symmetrical surface deflection angle; degrees; positive deflections are:
	AILRDN	aileron - total aileron deflection; (left aileron - right aileron)/2
	CANARD	canard - trailing edge down
	ELEVON	elevon - trailing edge down
	ELEVTR	elevator - trailing edge down
	FLAP	flap - trailing edge down
	RUDDER	rudder - trailing edge to the left
	SPOILR	spoiler - trailing edge down
	TAB	tab - trailing edge down with respect to control surface
δ		antisymmetrical surface deflection angle, degrees; positive trailing edge down:
	AIL-L	left aileron - trailing edge down
	AIL-R	right aileron - trailing edge down
	ELVN-L	left elevon - trailing edge down
	ELVN-R	right elevon - trailing edge down
	SPLR-L	left spoiler - trailing edge down
	SPLR-R	right spoiler - trailing edge down

<u>SURFACE SUBSCRIPTS</u>	<u>DEFINITION</u>
a	aileron
b	base
c	canard
e	elevator or elevon
f	flap
r	rudder or ruddervator
s	horizontal tail
t	tail

TABULATED DATA LISTING

A tabulated data listing, consisting of all aero data sets, both original and those created in arriving at the plotted material to be presented subsequently, is available as an addendum to this report. The tabular listing is made up in two sections:

- (a) a brief summary list of all data sets containing the identifier, the descriptor, and the resident dependent variables.
- (b) a full list of all data sets containing all resident or selected aerodynamic coefficients of the data sets as well as the above mentioned information.

The listing is currently sent on limited distribution to the following organizations:

NASA AMES	Mr. V. Stevens
GAC	Mr. M. Quan

If copies of this listing are desired, please contact the above or the cognizant SADSAC personnel who, for this data, is:

Miss B. J. Fricken
Department 2780
Chrysler Corporation Space Division
New Orleans, La. 70129

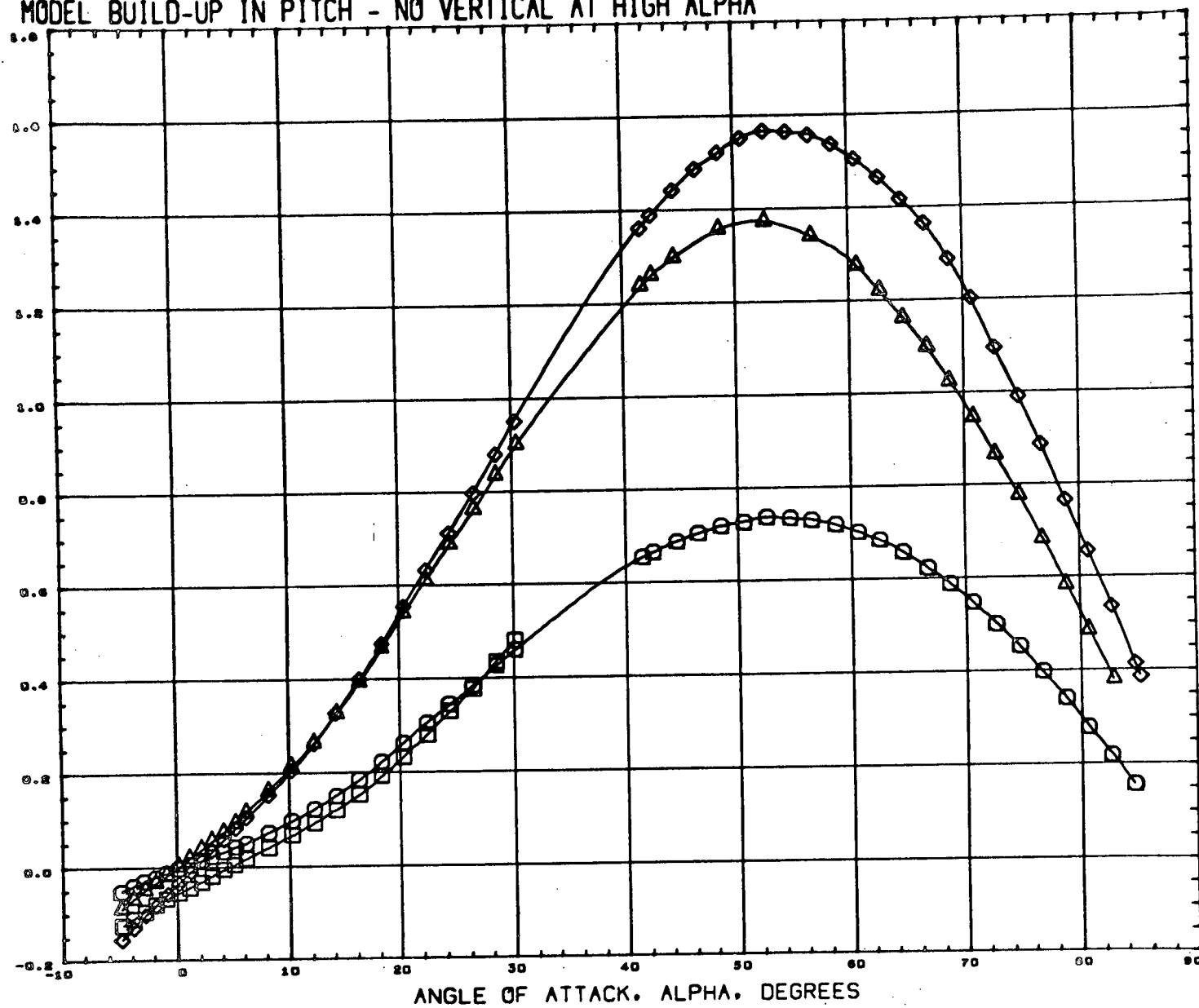
(504) 255-2304

P L O T T E D D A T A

Note: On plots where low and high alpha ranges are stacked, the CAF and CDF coefficients are in fact CA and CD for the high alpha range, i.e., these coefficients were not corrected for base pressures.

MODEL BUILD-UP IN PITCH - NO VERTICAL AT HIGH ALPHA

LIFT COEFFICIENT, CL



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX011) Q GAC HST-020 TBC H-32 BOOSTER B8V3
 (GCX021) D GAC HST-020 TBC H-32 BOOSTER B8W4V3
 (GCX031) S GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (GCX072) C GAC HST-020 TBC H-32 BOOSTER B8H4V3

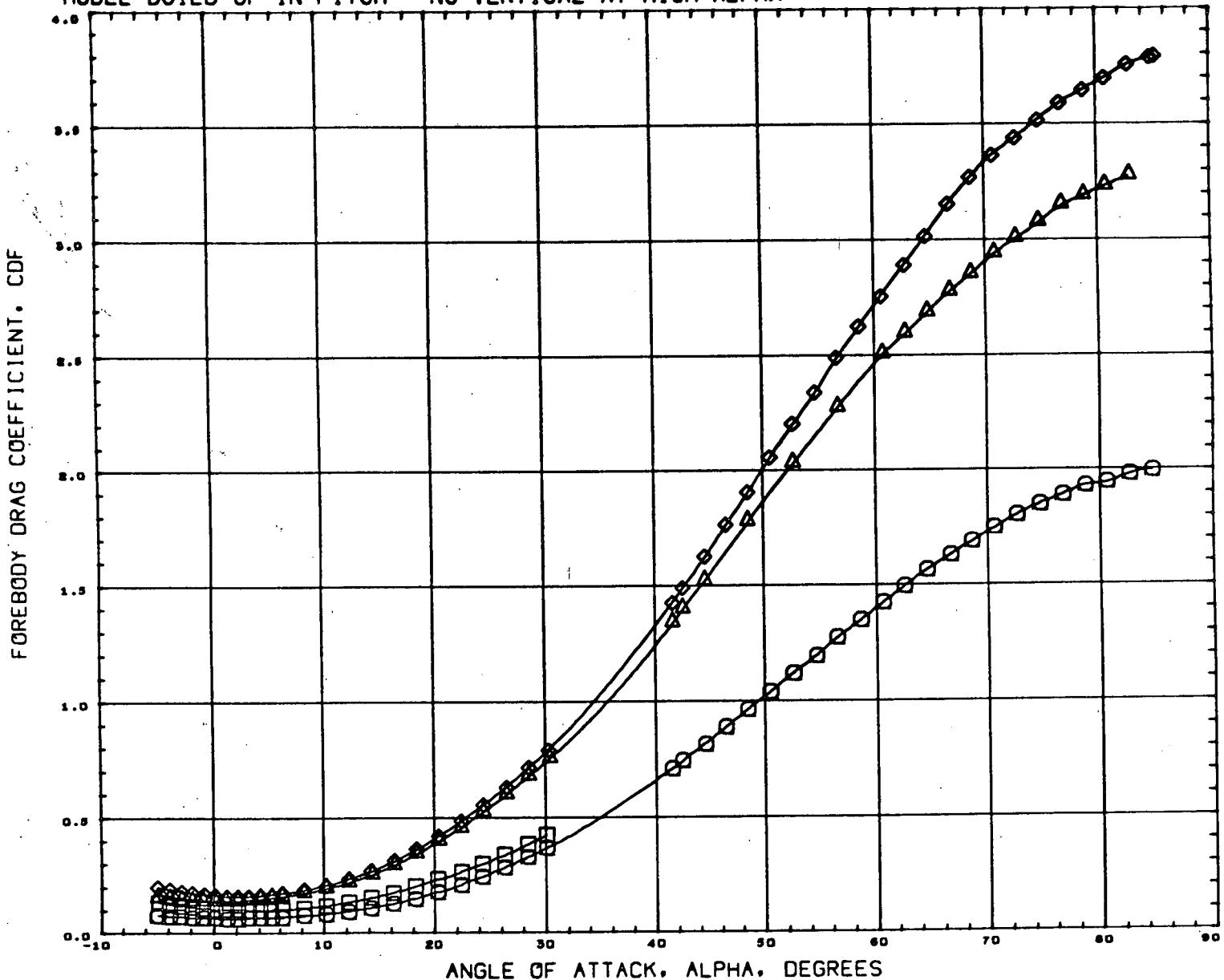
BETA HTAIL ELEVTR
 0.000 0.000 0.000
 0.000 -15.000 0.000
 0.000 -15.000 0.000

REFERENCE INFORMATION
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 LREF 1.4690 INCHES
 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCENT

MACH 0.120

PAGE 1

MODEL BUILD-UP IN PITCH - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX011)	GAC HST-020 TBC H-32 BOOSTER B8V3
(GCX021)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCX031)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX272)	GAC HST-020 TBC H-32 BOOSTER B8H4V3

BETA	HTAIL	ELEVTR
0.000		
0.000	-15.000	0.000
0.000	-15.000	0.000

REFERENCE INFORMATION
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LREF 1.4680 INCHES
BREF 9.6520 INCHES
XMRP 7.6210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.9870 INCHES
SCALE 0.4348 PERCNT

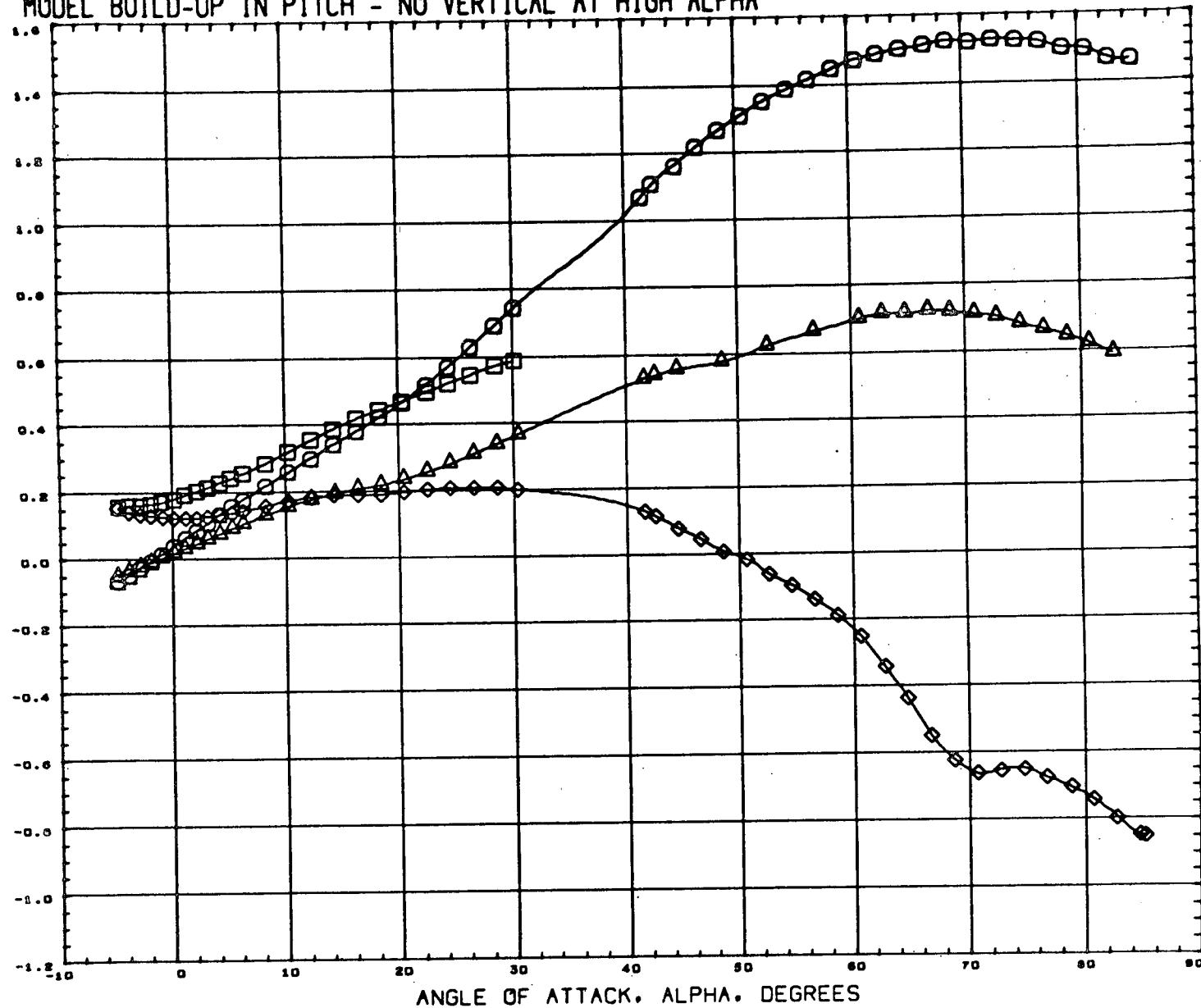
MACH 0.120

PAGE

2

MODEL BUILD-UP IN PITCH - NO VERTICAL AT HIGH ALPHA

PITCHING MOMENT COEFFICIENT. CLM



ANGLE OF ATTACK. ALPHA. DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX011)	GAC HST-D2D TBC H-32 BOOSTER B8V3
(GCX021)	GAC HST-D2D TBC H-32 BOOSTER B8W4V3
(GCX081)	GAC HST-D2D TBC H-32 BOOSTER B8W4H4V3
(RCX272)	GAC HST-D2D TBC H-32 BOOSTER B8H4V3

BETA	HTAIL	ELEVTR
0.000		
0.000		
0.000 -15.000	0.000	
0.000 -15.000	0.000	

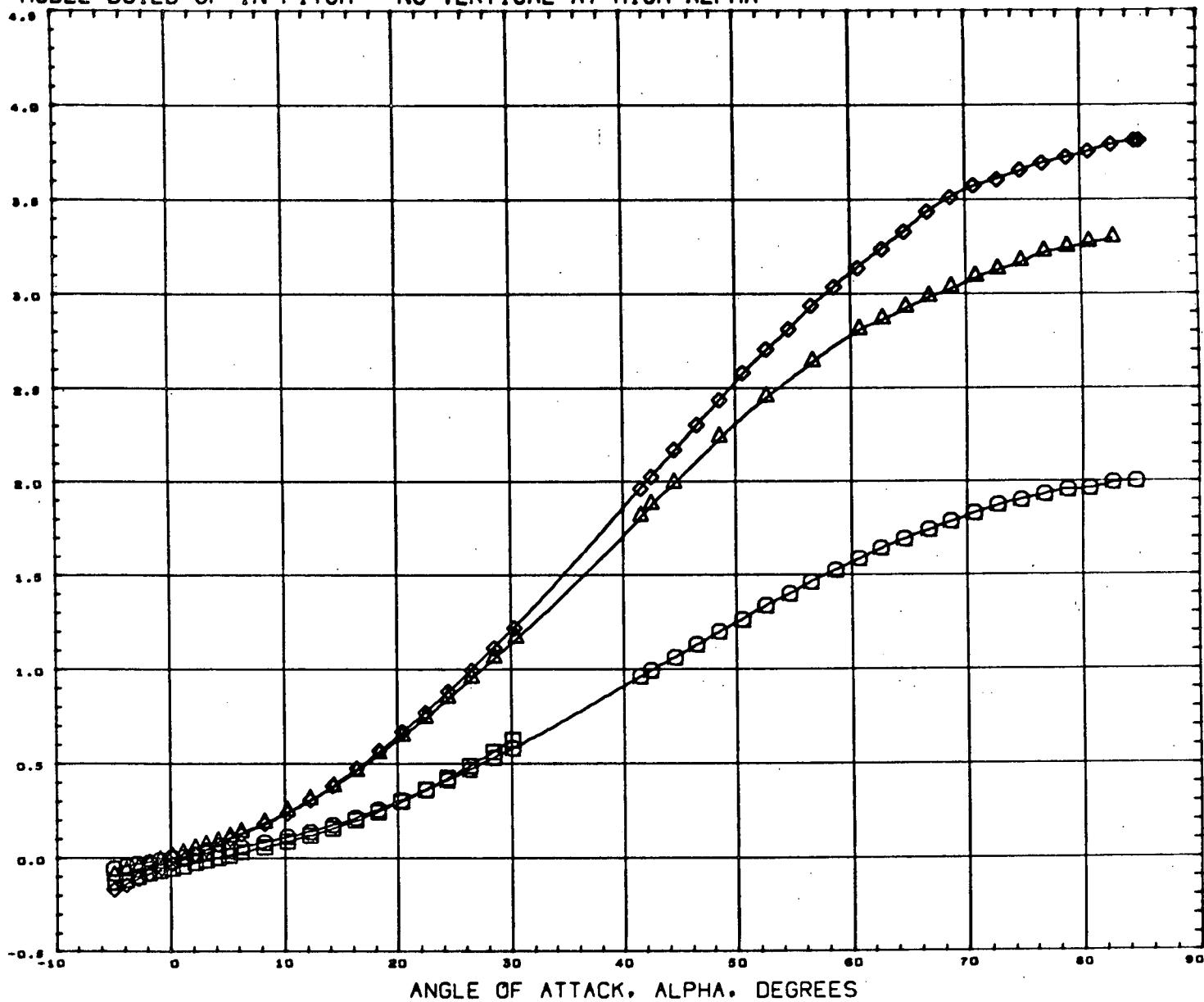
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LREF 1.4680	INCHES
BREF 9.6520	INCHES
XMRP 7.8210	INCHES
YMRP 0.0000	INCHES
ZMRP 1.5870	INCHES
SCALE 0.4348	PERCNT

MACH 0.120

PAGE 3

MODEL BUILD-UP IN PITCH - NO VERTICAL AT HIGH ALPHA

NORMAL FORCE COEFFICIENT, CN



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX011) GAC HST-020 TBC H-32 BOOSTER B8V3
 (GCX021) GAC HST-020 TBC H-32 BOOSTER B8W4V3
 (GCX061) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCX272) GAC HST-020 TBC H-32 BOOSTER B8H4V3

BETA HTAIL ELEVTR

0.000		
0.000		
0.000	-15.000	0.000
0.000	-15.000	0.000

REFERENCE INFORMATION

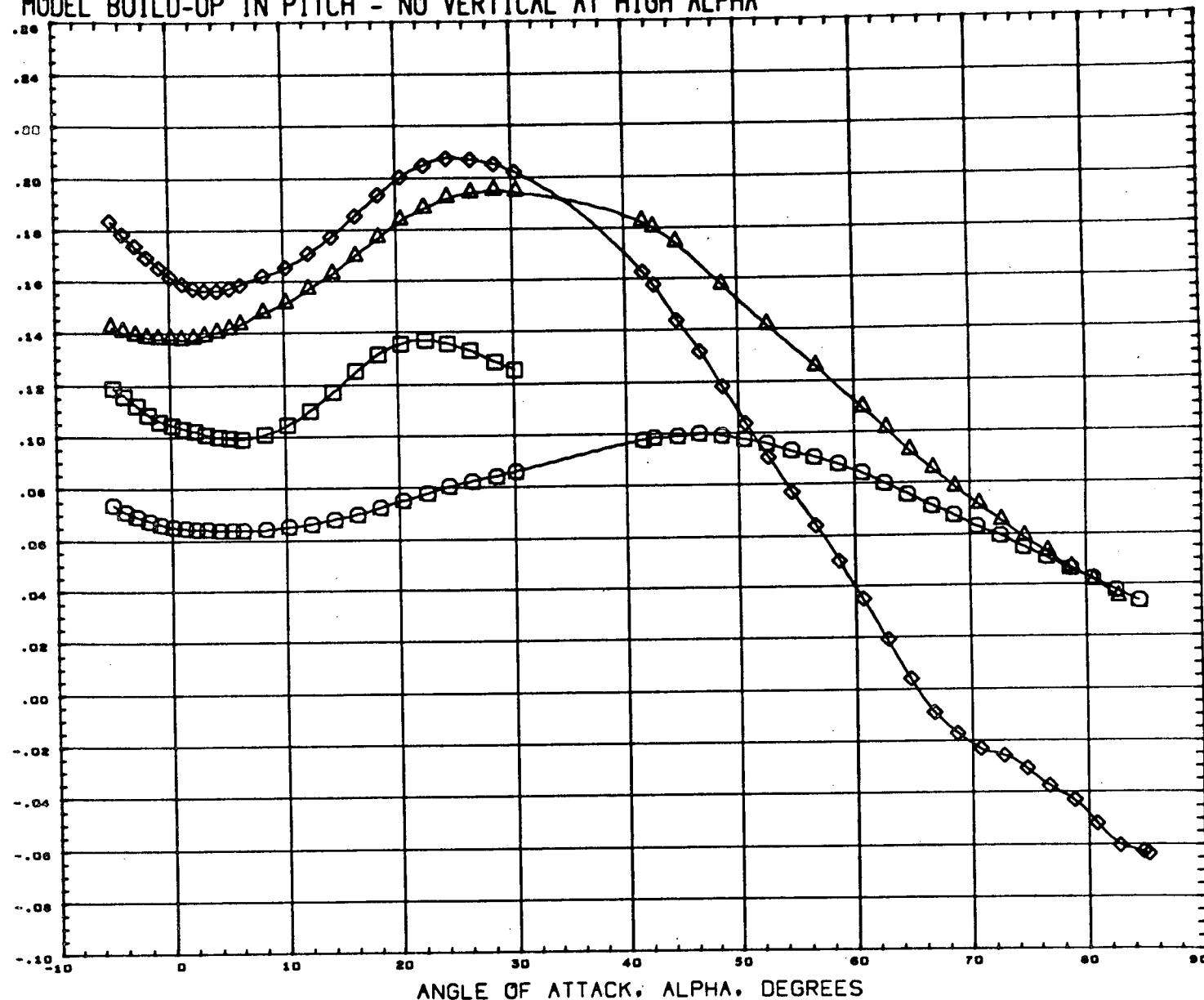
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LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4346	PERCNT

MACH 8.120

PAGE 4

MODEL BUILD-UP IN PITCH - NO VERTICAL AT HIGH ALPHA

FOREBODY AXIAL FORCE COEFFICIENT, CAF



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX011)	GAC HST-020 TBC H-32 BOOSTER B8V3
(GCX021)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCX081)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX272)	GAC HST-020 TBC H-32 BOOSTER B8H4V3

BETA	HTAIL	ELEVTR
0.000		
0.000	-15.000	0.000
0.000	-15.000	0.000

REFERENCE INFORMATION
SREF 13.3440 SQ.IN.
LREF 1.4680 INCHES
BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCNT

MACH

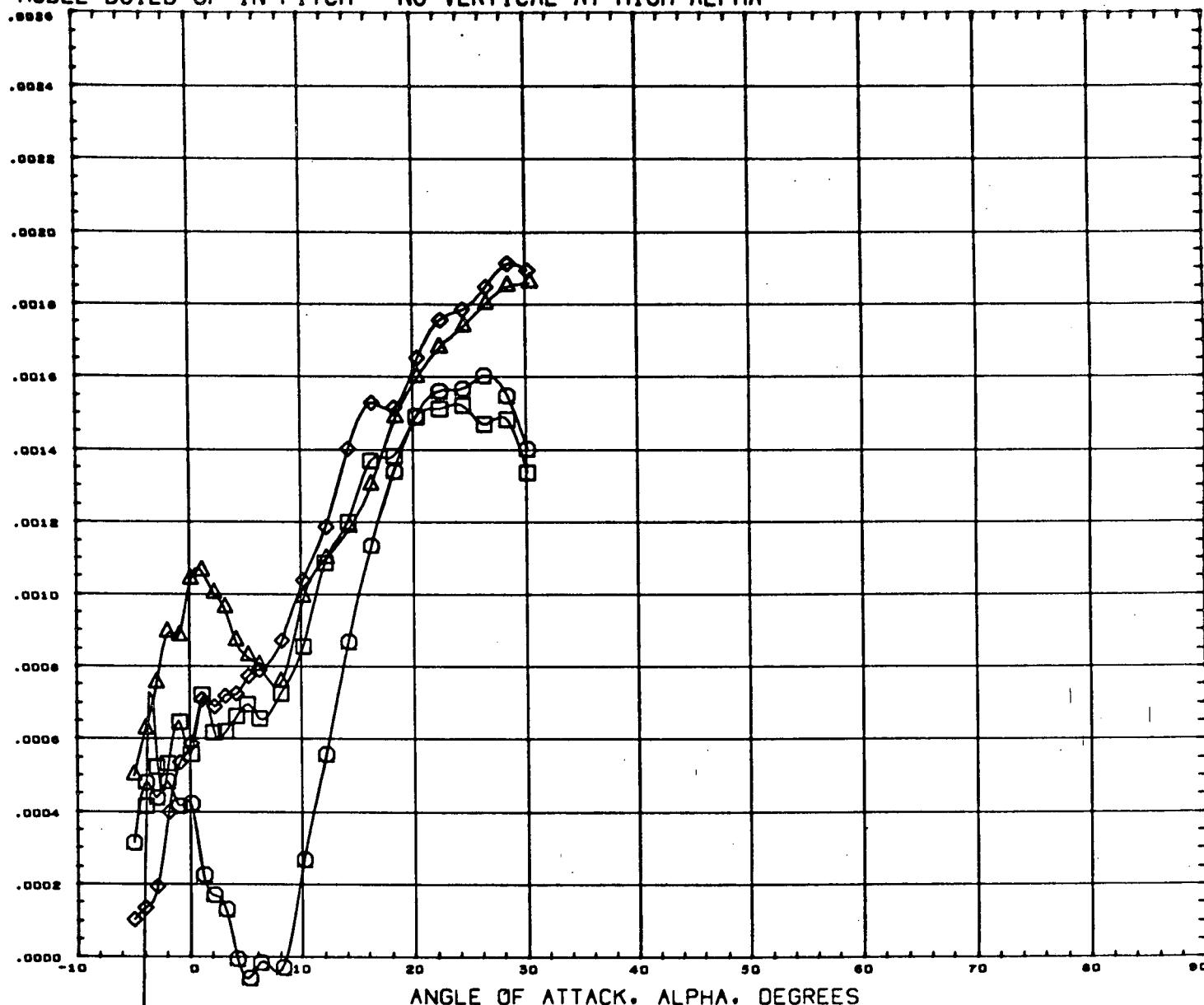
8.120

PAGE

5

MODEL BUILD-UP IN PITCH - NO VERTICAL AT HIGH ALPHA

BASE DRAG COEFFICIENT. CDB



ANGLE OF ATTACK. ALPHA. DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(FCX192)	GAC HST-020 TBC H-32 BOOSTER B8V3
(FCX202)	GAC HST-020 TBC H-32 BOOSTER B8H4V3
(FCX222)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(FCX272)	GAC HST-020 TBC H-32 BOOSTER B8H4V3

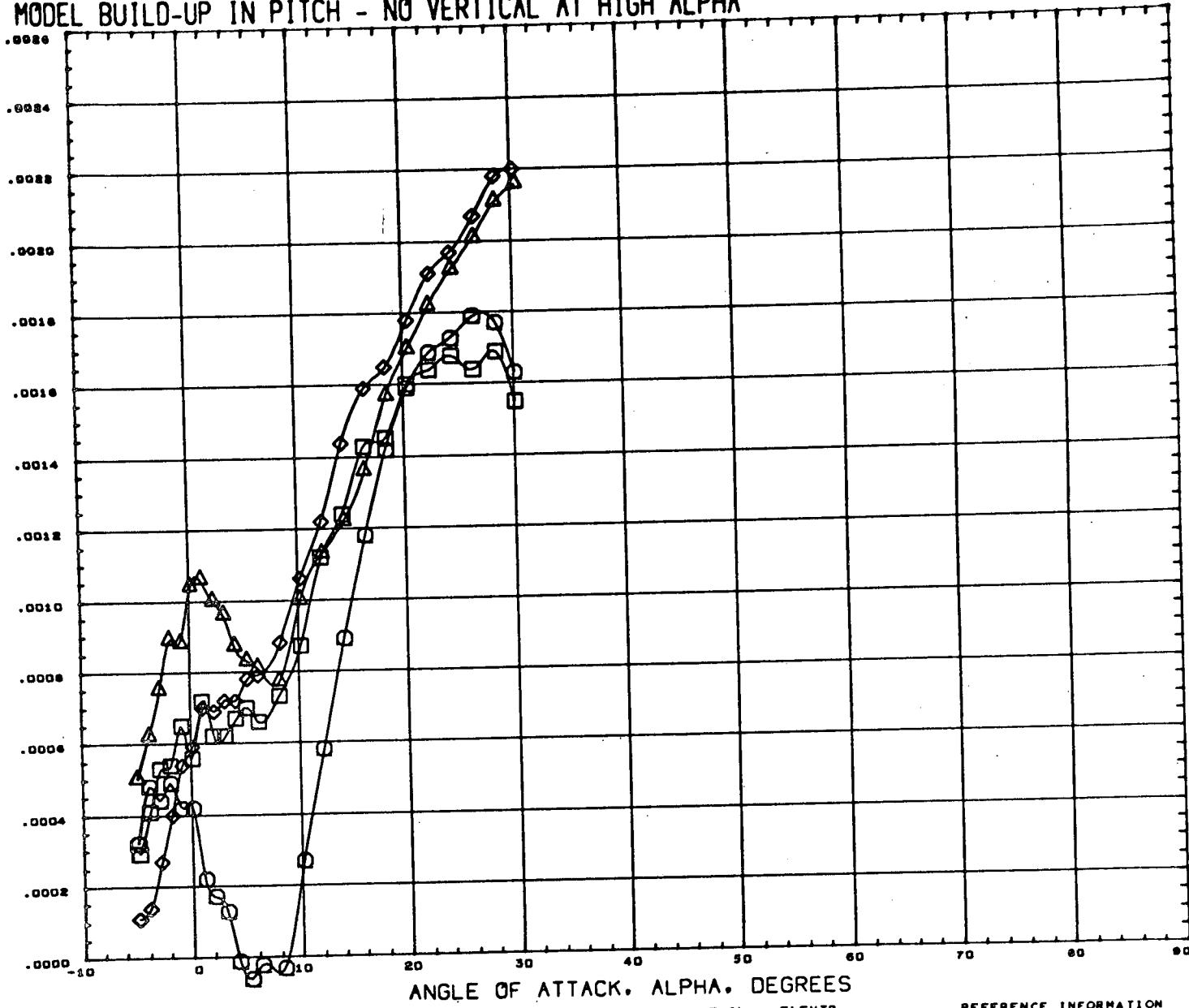
BETA	MTAIL	ELEVTR
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0.000		
0.000	-15.000	0.000
0.000	-15.000	0.000

REFERENCE INFORMATION
SREF 13.3440 SQ. IN.
LREF 1.4680 INCHES
BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCNT

MACH 8.120

MODEL BUILD-UP IN PITCH - NO VERTICAL AT HIGH ALPHA

BASE AXIAL FORCE COEFFICIENT. CAB



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	B8V3	B8W4V3	B8H4V3
(FCX192)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000
(FCX202)	GAC HST-020 TBC H-32 BOOSTER	0.000	-15.000	0.000
(FCX222)	GAC HST-020 TBC H-32 BOOSTER	0.000	-15.000	0.000
(FCX272)	GAC HST-020 TBC H-32 BOOSTER			

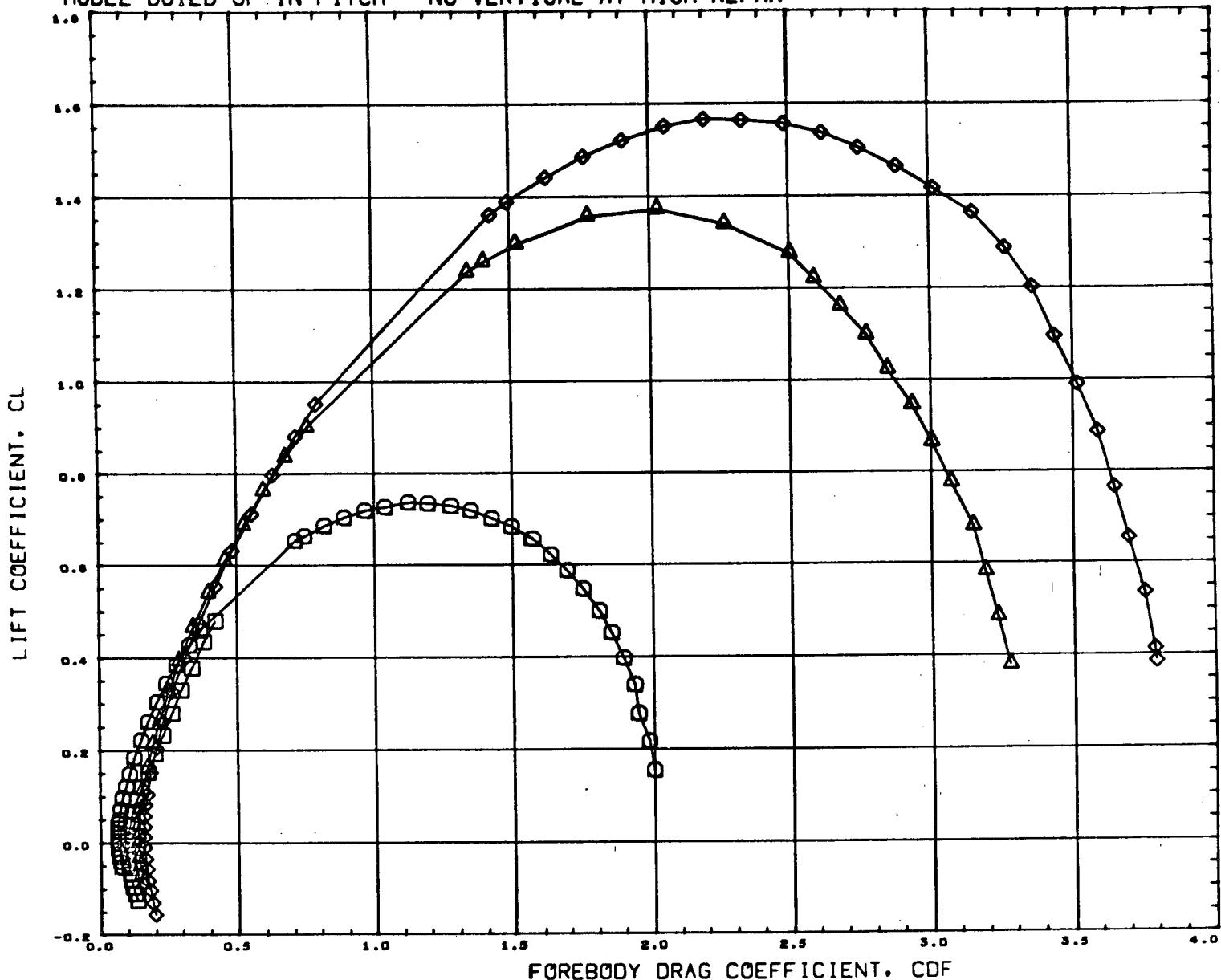
BETA HTAIL ELEVTR

REFERENCE INFORMATION		
SREF	13.3440	SL. IN.
LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4340	PERCNT

MACH 0.120

PAGE 7

MODEL BUILD-UP IN PITCH - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX011)	GAC HST-020 TBC H-32 BOOSTER B8V3
(GCX021)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCX081)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX272)	GAC HST-020 TBC H-32 BOOSTER B8H4V3

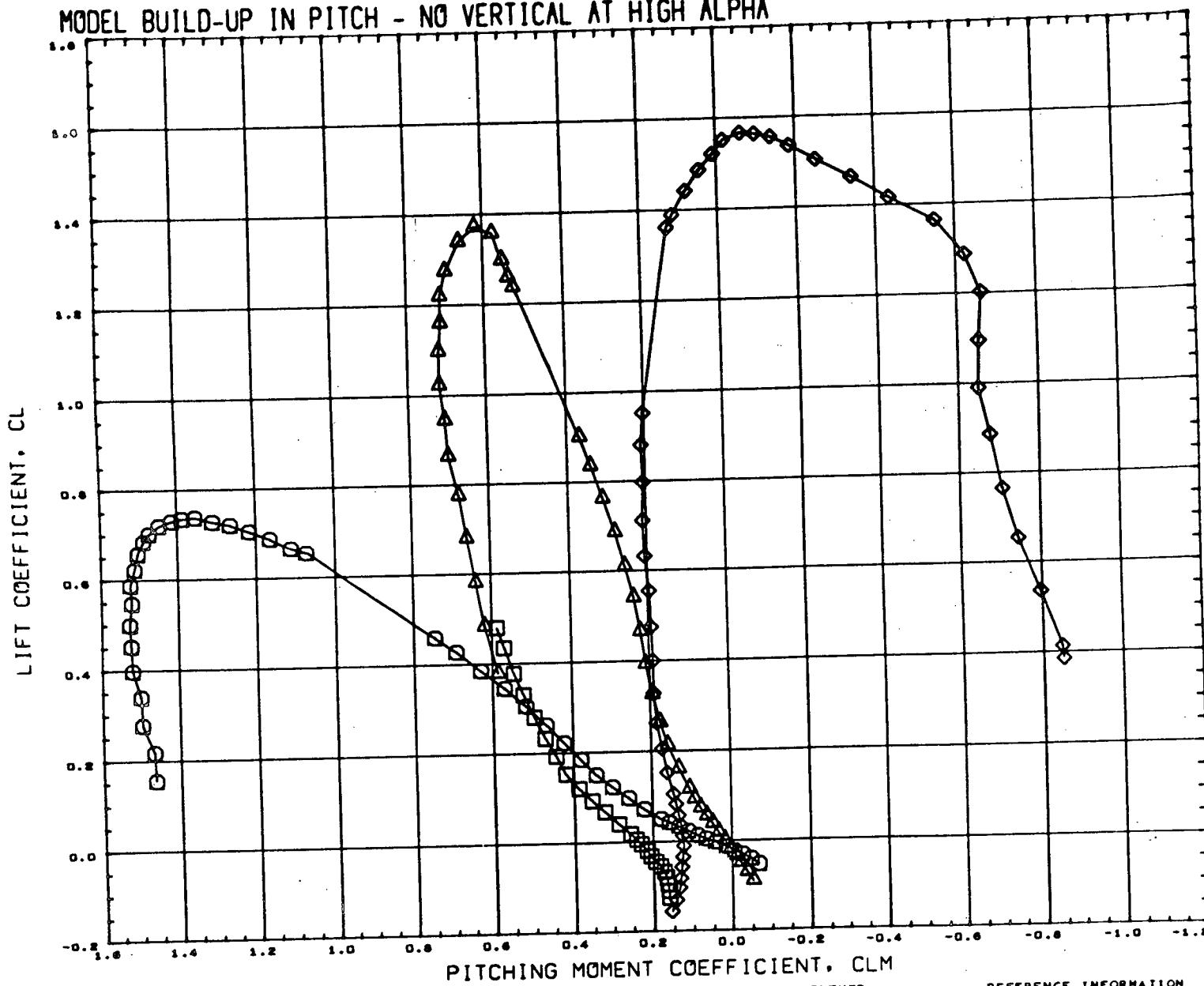
BETA	HTAIL	ELEVTR
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0.000		
0.000 -15.000	0.000	
0.000 -15.000	0.000	

REFERENCE INFORMATION
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LREF 1.4680 INCHES
BREF 9.6520 INCHES
XMRP 7.6210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4346 PERCNT

MACH 0.120

PAGE 8

MODEL BUILD-UP IN PITCH - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX011)	GAC HST-020 TBC H-32 BOOSTER B8V3
(GCX021)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCX041)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX272)	GAC HST-020 TBC H-32 BOOSTER B8H4V3

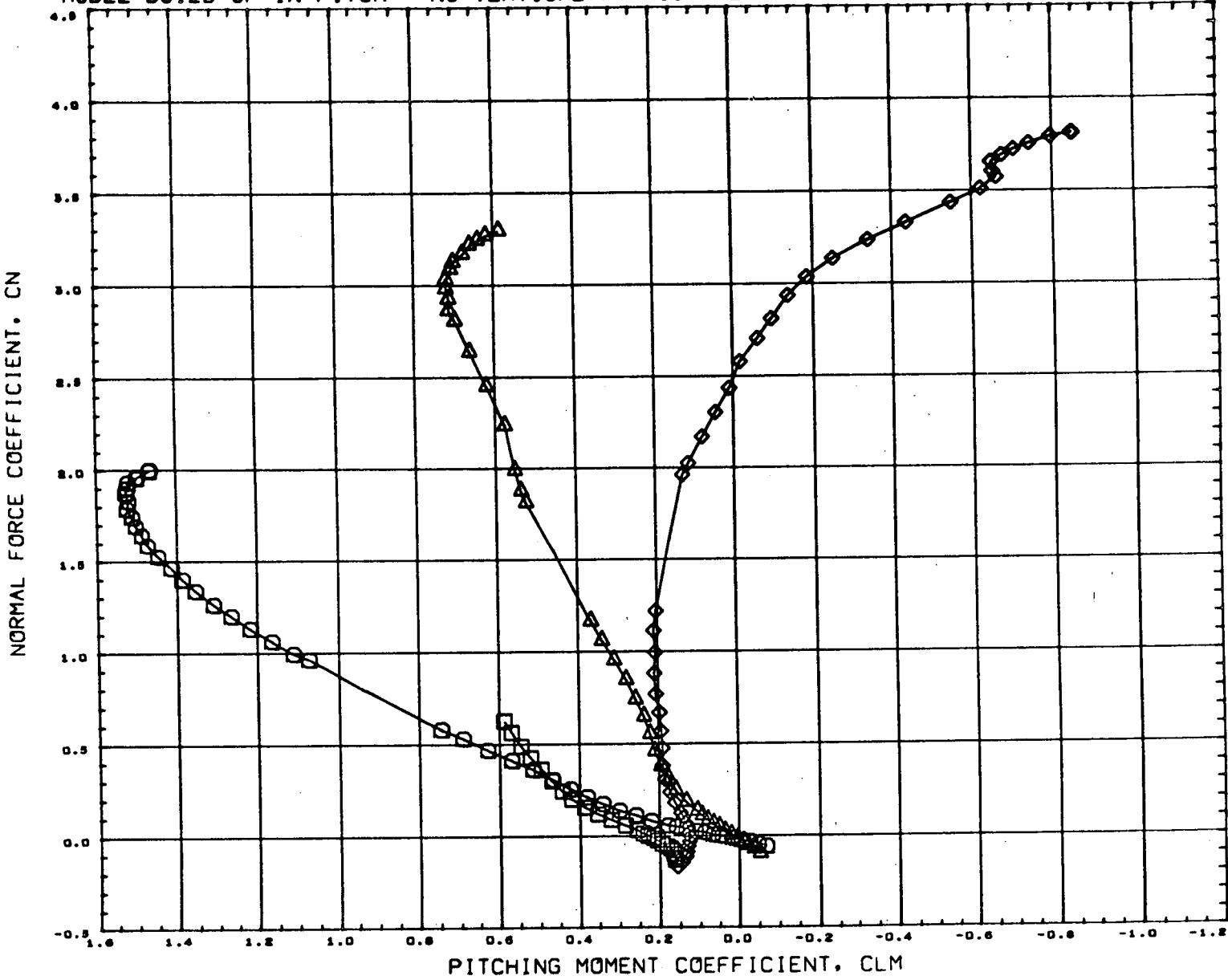
BETA	HTAIL	ELEVTR
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0.000		
0.000	-15.000	0.000
0.000	-15.000	0.000

REFERENCE INFORMATION		
SREF	13.3440	SQ. IN.
LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4348	PERCNT

MACH 8.120

PAGE 9

MODEL BUILD-UP IN PITCH - NO VERTICAL AT HIGH ALPHA



PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX011)	GAC HST-020 TBC H-32 BOOSTER B8V3
(GCX021)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCX081)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX272)	GAC HST-020 TBC H-32 BOOSTER B8H4V3

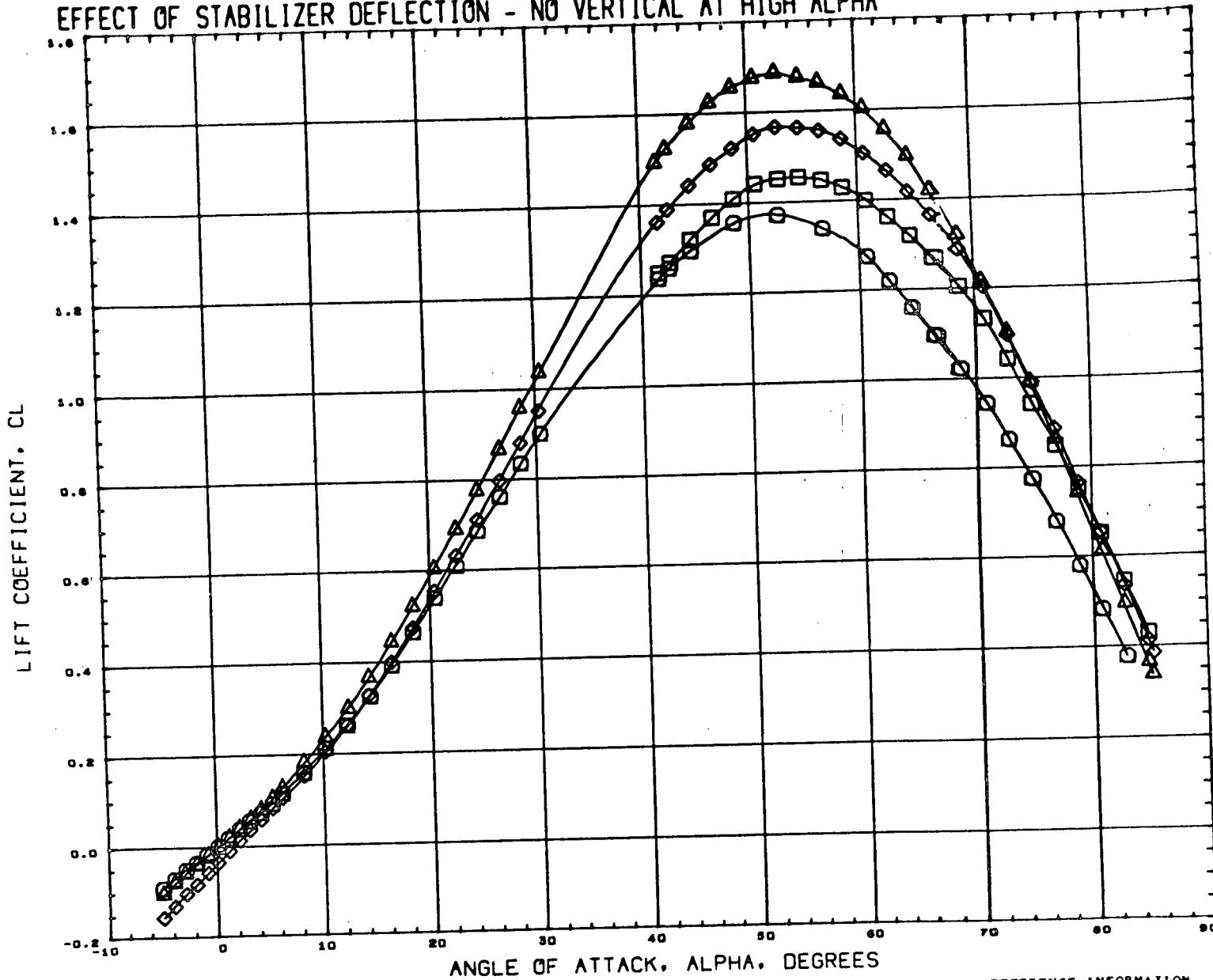
BETA	MTAIL	ELEVTR
0.000		
0.000	-15.000	0.000
0.000	-15.000	0.000

REFERENCE INFORMATION
SREF 13.3440 SQ.IN.
LREF 1.4680 INCHES
BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCNT

MACH 8.120

PAGE 10

EFFECT OF STABILIZER DEFLECTION - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX021)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCX031)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(GCX081)	GAC HST-020 TBC H-32 BOOSTER B8W4H4
(RCX001)	GAC HST-020 TBC H-32 BOOSTER B8W4H4

BETA	HTAIL	ELEVTR
0.000	0.000	0.000
0.000	-15.000	0.000
0.000	-30.000	0.000

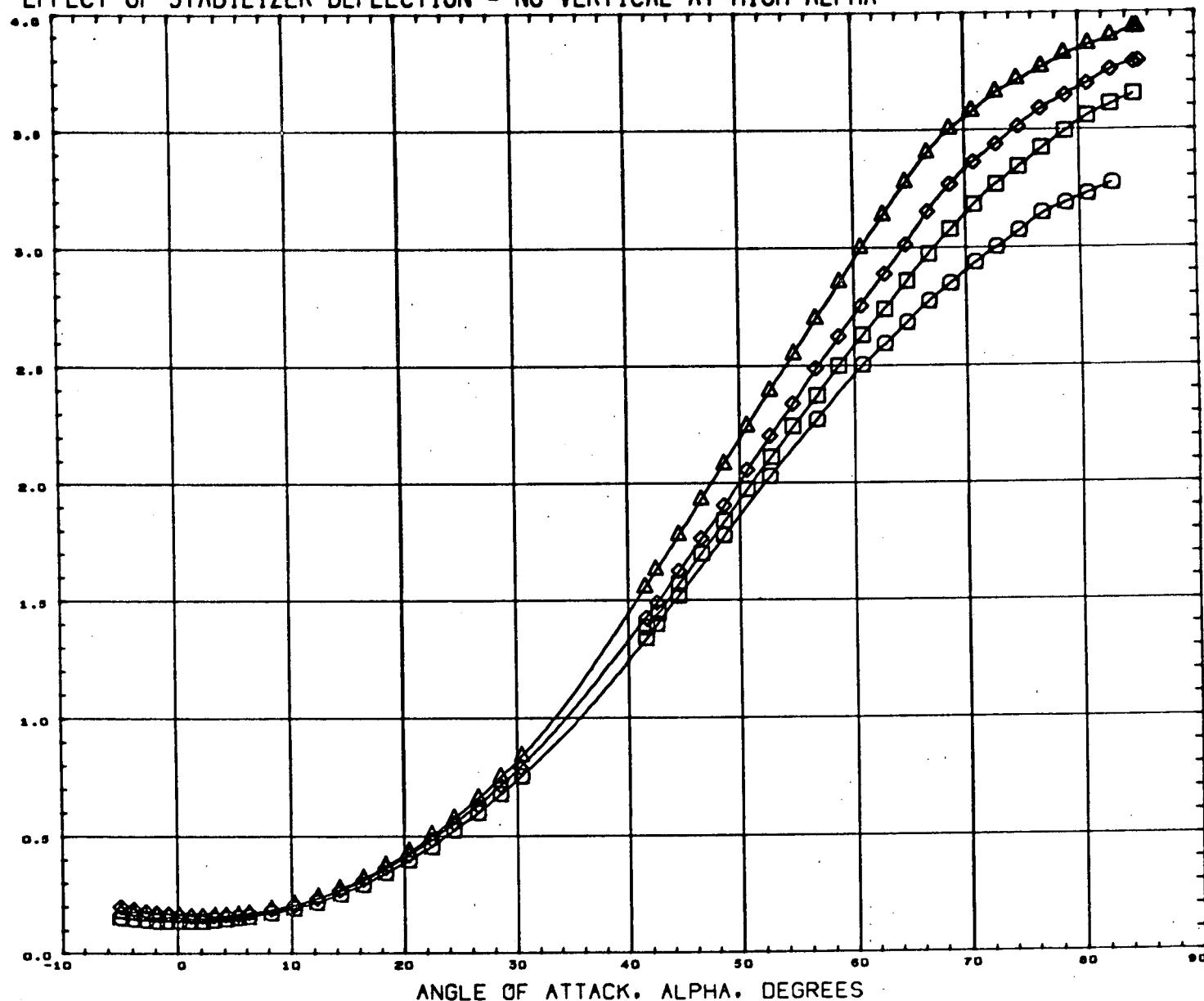
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LREF 1.4680 INCHES
BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCENT

MACH 0.120

PAGE 11

EFFECT OF STABILIZER DEFLECTION - NO VERTICAL AT HIGH ALPHA

FOREBODY DRAG COEFFICIENT. CDF



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX021)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCX031)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(GCX081)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX091)	GAC HST-020 TBC H-32 BOOSTER B8W4H4

BETA	HTAIL	ELEVTR
0.000	0.000	0.000
0.000	-15.000	0.000
0.000	-30.000	0.000

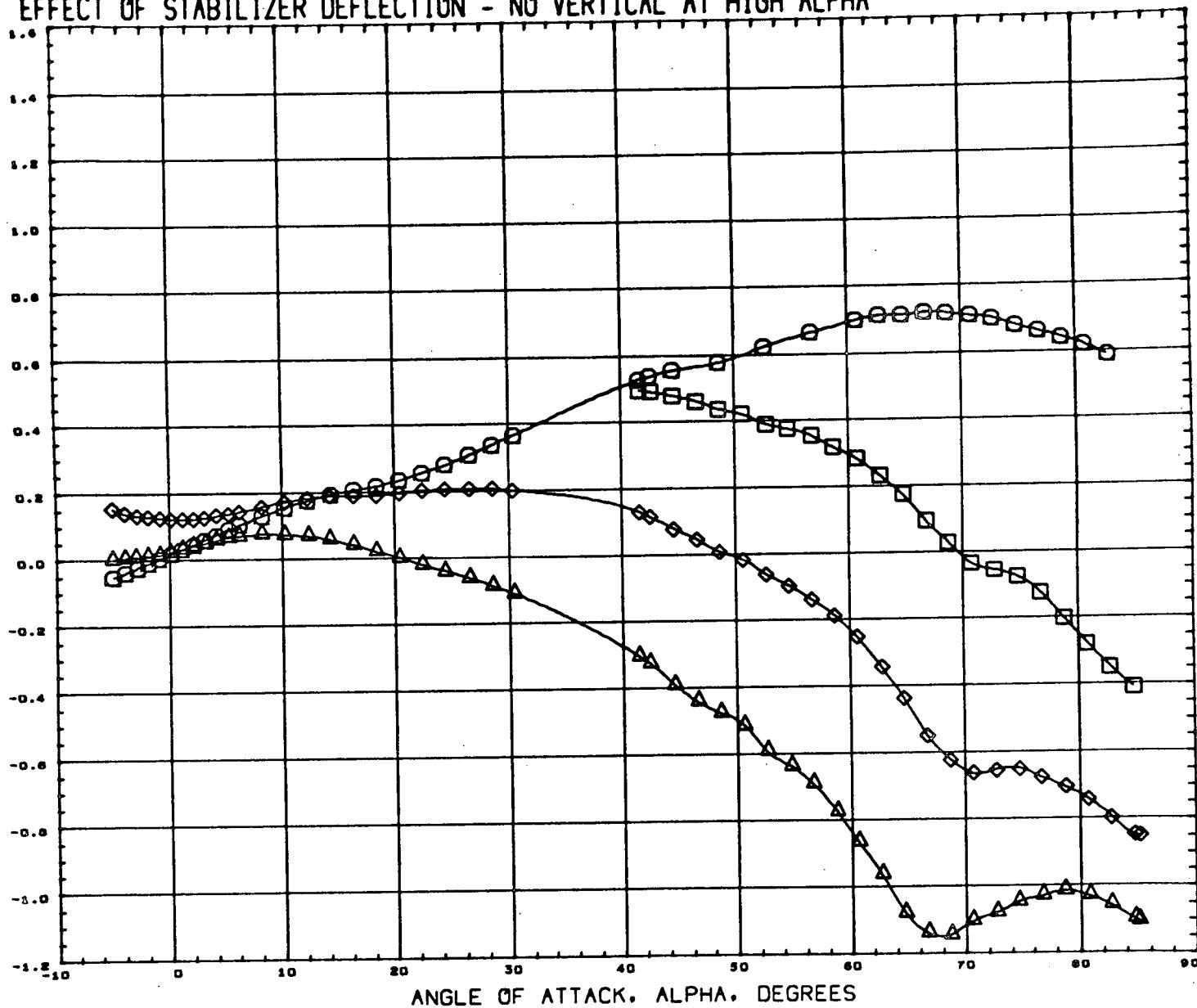
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LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.3670	INCHES
SCALE	0.4348	PERCNT

MACH 6.120

PAGE 12

EFFECT OF STABILIZER DEFLECTION - NO VERTICAL AT HIGH ALPHA

PITCHING MOMENT COEFFICIENT, CLM



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	HTAIL	ELEVTR
(GCXD21)	GAC HST-020 TBC H-32 BOOSTER B6W4V3	0.000	0.000	0.000
(GCXD31)	GAC HST-020 TBC H-32 BOOSTER B6W4H4V3	0.000	-15.000	0.000
(GCXD61)	GAC HST-020 TBC H-32 BOOSTER B6W4H4V3	0.000	-30.000	0.000
(RCXD91)	GAC HST-020 TBC H-32 BOOSTER B6W4H4			

BETA HTAIL ELEVTR

REFERENCE INFORMATION		
SREF	13.3440	SQ. IN.
LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4348	PERCNT

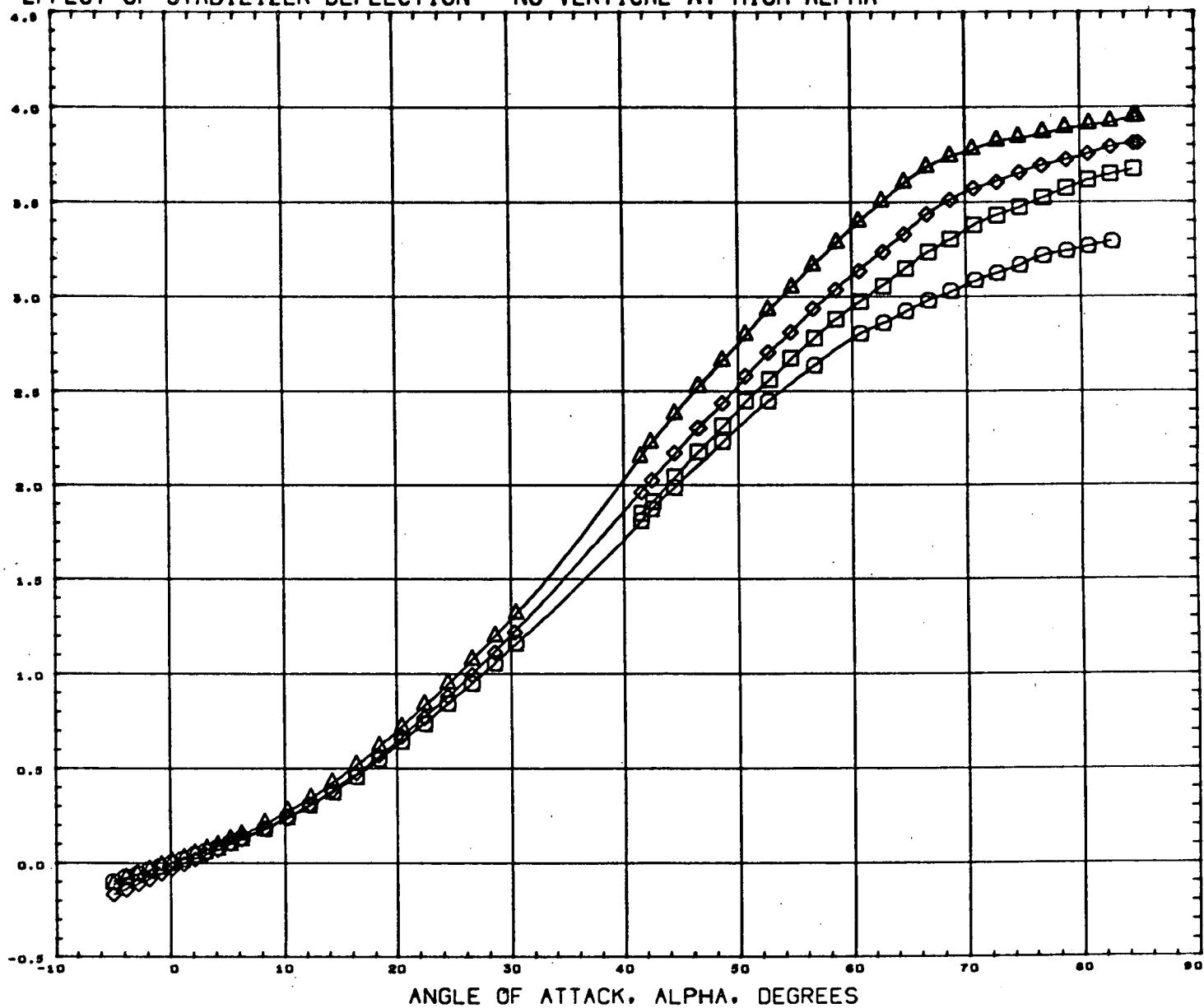
MACH 0.120

PAGE 13

20

EFFECT OF STABILIZER DEFLECTION - NO VERTICAL AT HIGH ALPHA

NORMAL FORCE COEFFICIENT, CN



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX021)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCX031)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(GCX081)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(GCX091)	GAC HST-020 TBC H-32 BOOSTER B8W4H4

BETA	MTAIL	ELEVTR
0.000	0.000	0.000
0.000	0.000	0.000
0.000	-15.000	0.000
0.000	-30.000	0.000

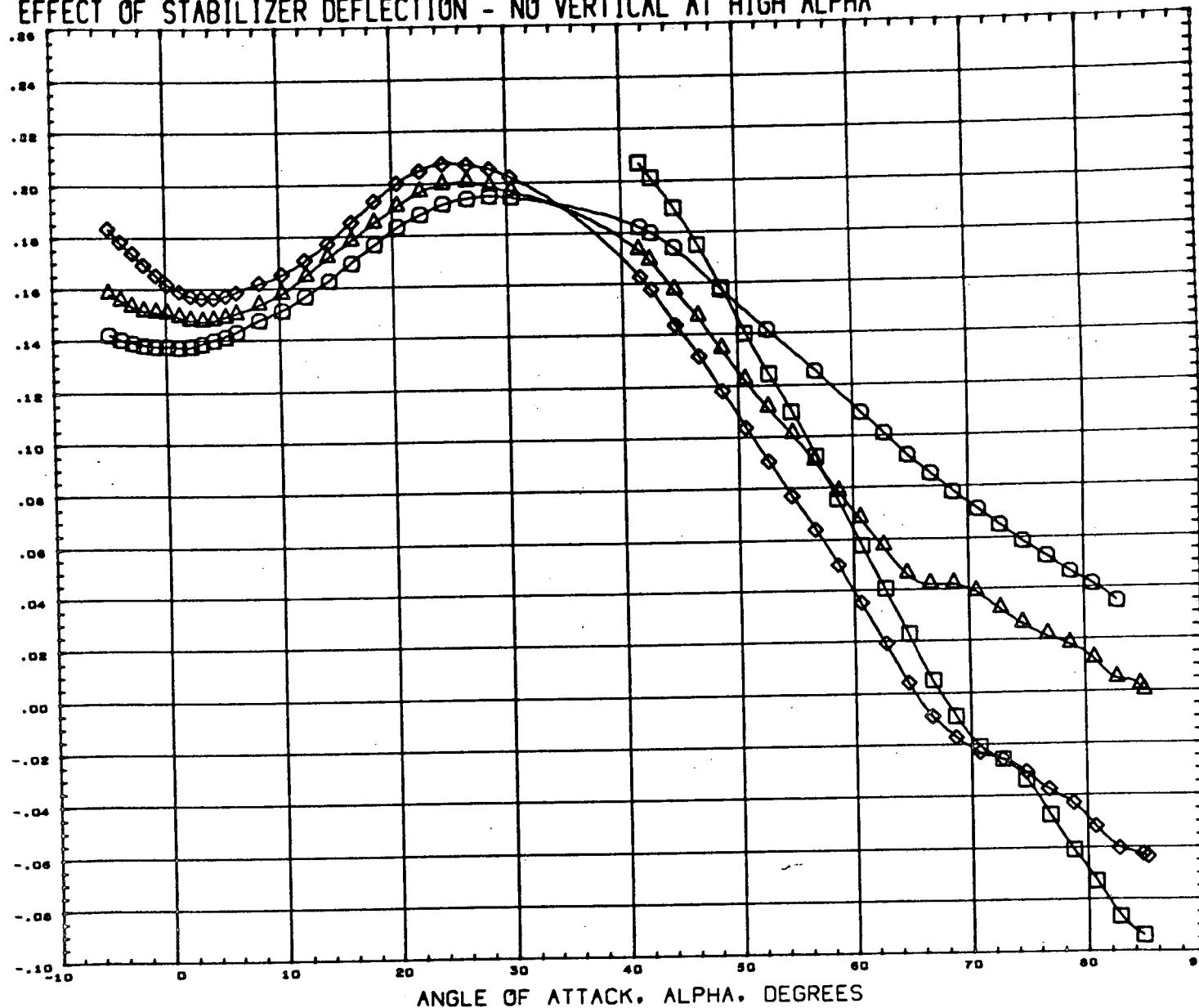
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BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCNT

MACH 0.120

PAGE 14

EFFECT OF STABILIZER DEFLECTION - NO VERTICAL AT HIGH ALPHA

FOREBODY AXIAL FORCE COEFFICIENT, C_A



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCXU21)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCXD31)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(GCXD81)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCXD91)	GAC HST-020 TBC H-32 BOOSTER B8W4H4

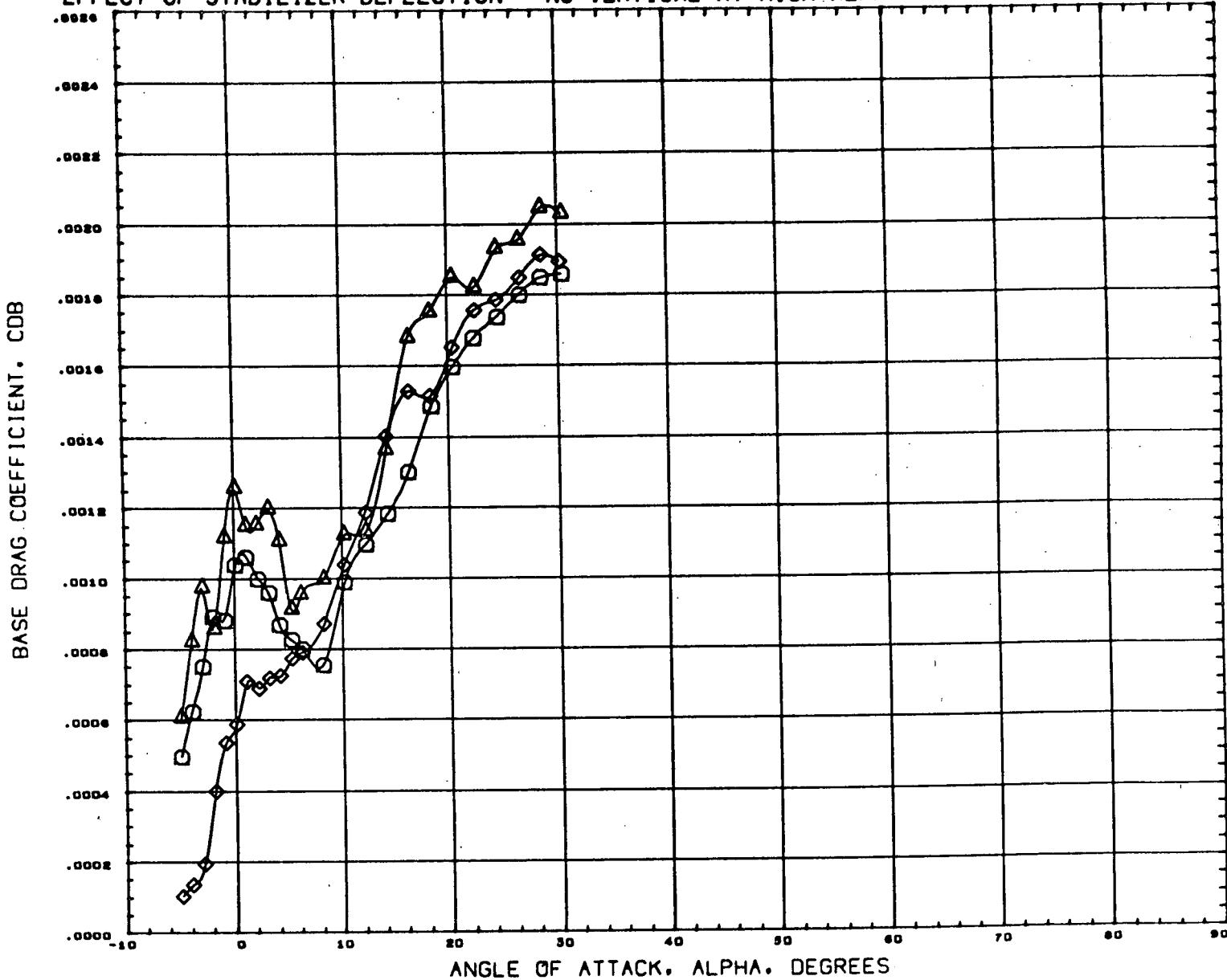
BETA	HTAIL	ELEVTR
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0.000	-15.000	0.000
0.000	-30.000	0.000

REFERENCE INFORMATION
SREF 13.3440 3Q. IN.
LREF 1.4680 INCHES
BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCNT

MACH 0.120

PAGE 15

EFFECT OF STABILIZER DEFLECTION - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(IFCX202)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(IFCX232)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(IFCX222)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

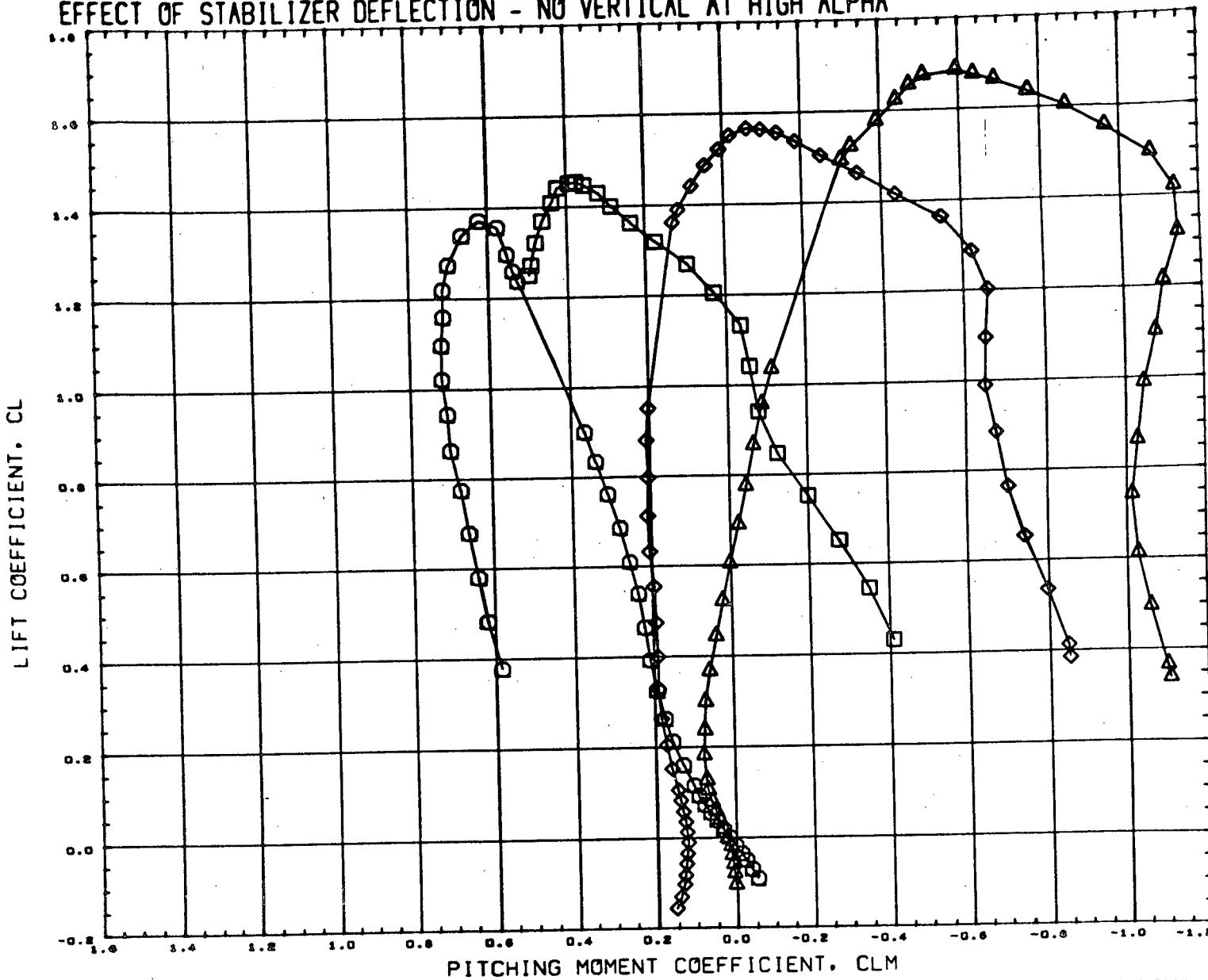
BETA	HTAIL	ELEVTR
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0.000	-15.000	0.000

REFERENCE INFORMATION		
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BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5670	INCHES
SCALE	0.4346	PERCNT

MACH 8.120

PAGE 16

EFFECT OF STABILIZER DEFLECTION - NO VERTICAL AT HIGH ALPHA



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(GCX021)	○	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCX031)	□	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(GCX081)	◇	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX081)	△	GAC HST-020 TBC H-32 BOOSTER B8W4H4

ALPHA ELEVTR HTAIL

0.000	0.000
0.000	-15.000
0.000	-30.000

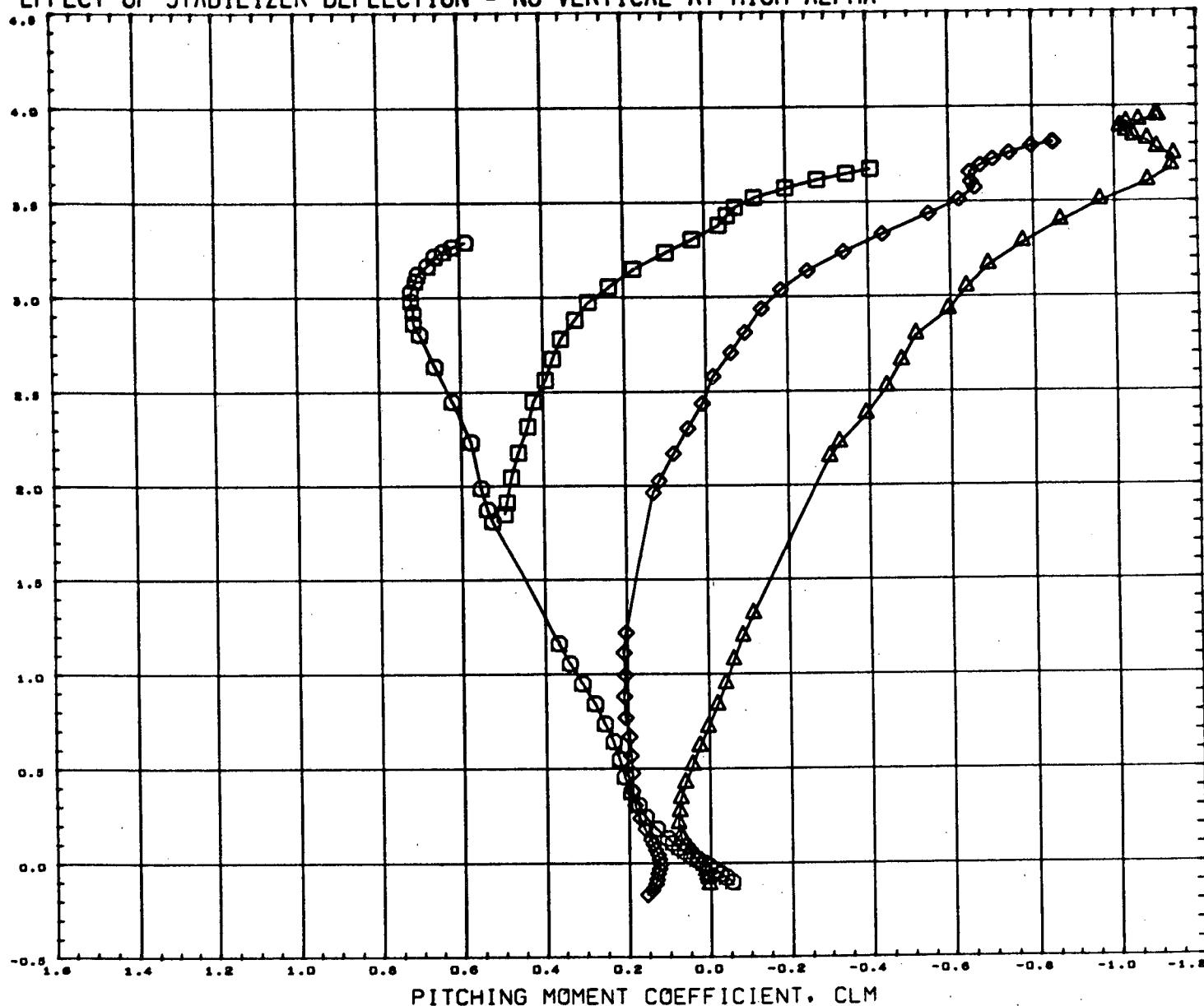
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BREF	9.6520	INCHES
XHRP	7.8210	INCHES
YHRP	0.0000	INCHES
ZHRP	1.5870	INCHES
SCALE	0.4348	PERCNT

MACH 6.120

PAGE 17

EFFECT OF STABILIZER DEFLECTION - NO VERTICAL AT HIGH ALPHA

NORMAL FORCE COEFFICIENT, CN



PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX021)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(GCX031)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(GCX061)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX091)	GAC HST-020 TBC H-32 BOOSTER B8W4H4

ALPHA ELEVTR HTAIL

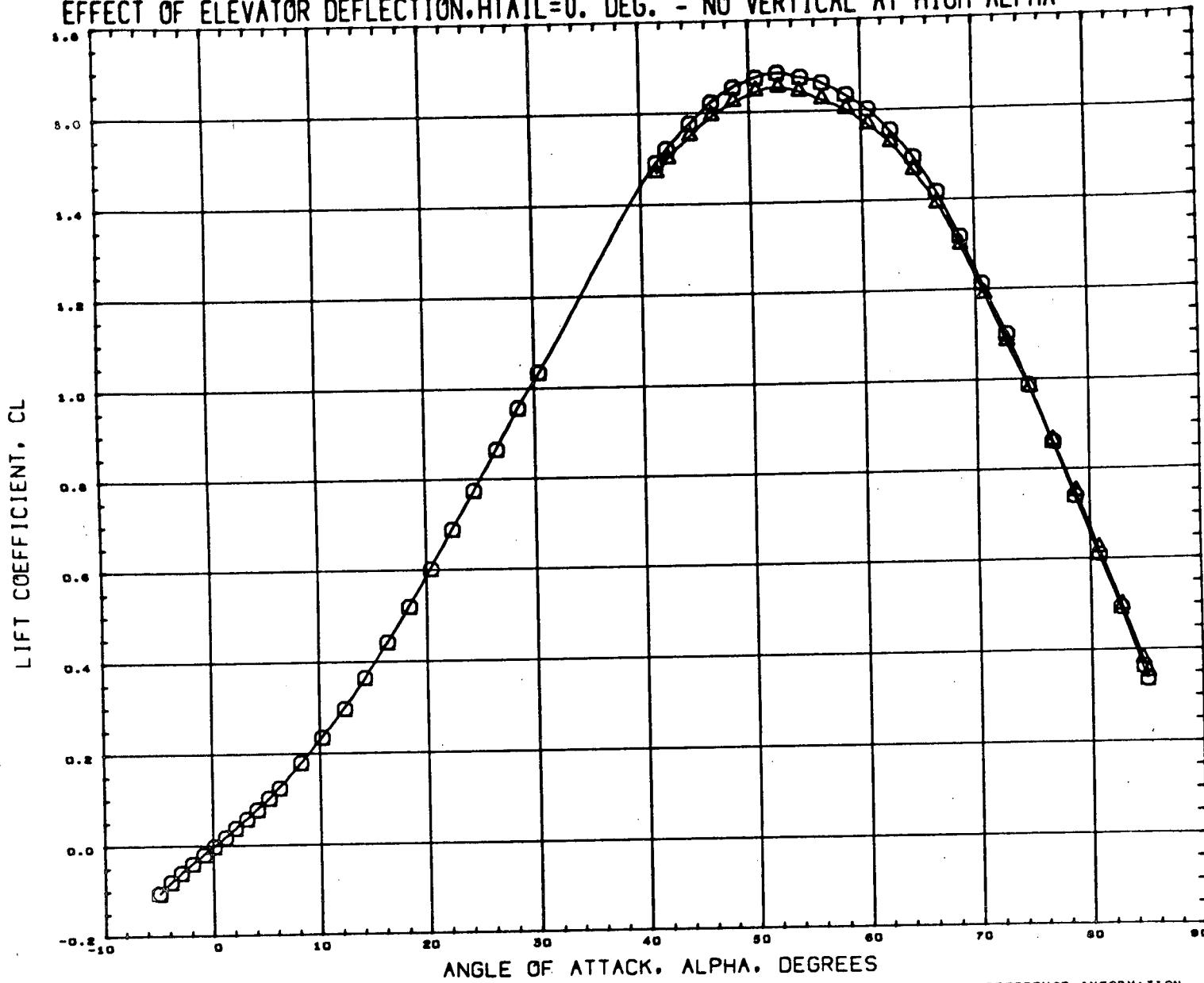
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0.000	-30.000

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BREF 9.6520 INCHES
XMRP 7.6210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCNT

MACH 8.120

PAGE 18

EFFECT OF ELEVATOR DEFLECTION.HTAIL=0. DEG. - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX031) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCX041) GAC HST-020 TBC H-32 BOOSTER B8W4H4

BETA HTAIL ELEVTR
 0.000 0.000 0.000
 0.000 0.000 -15.000

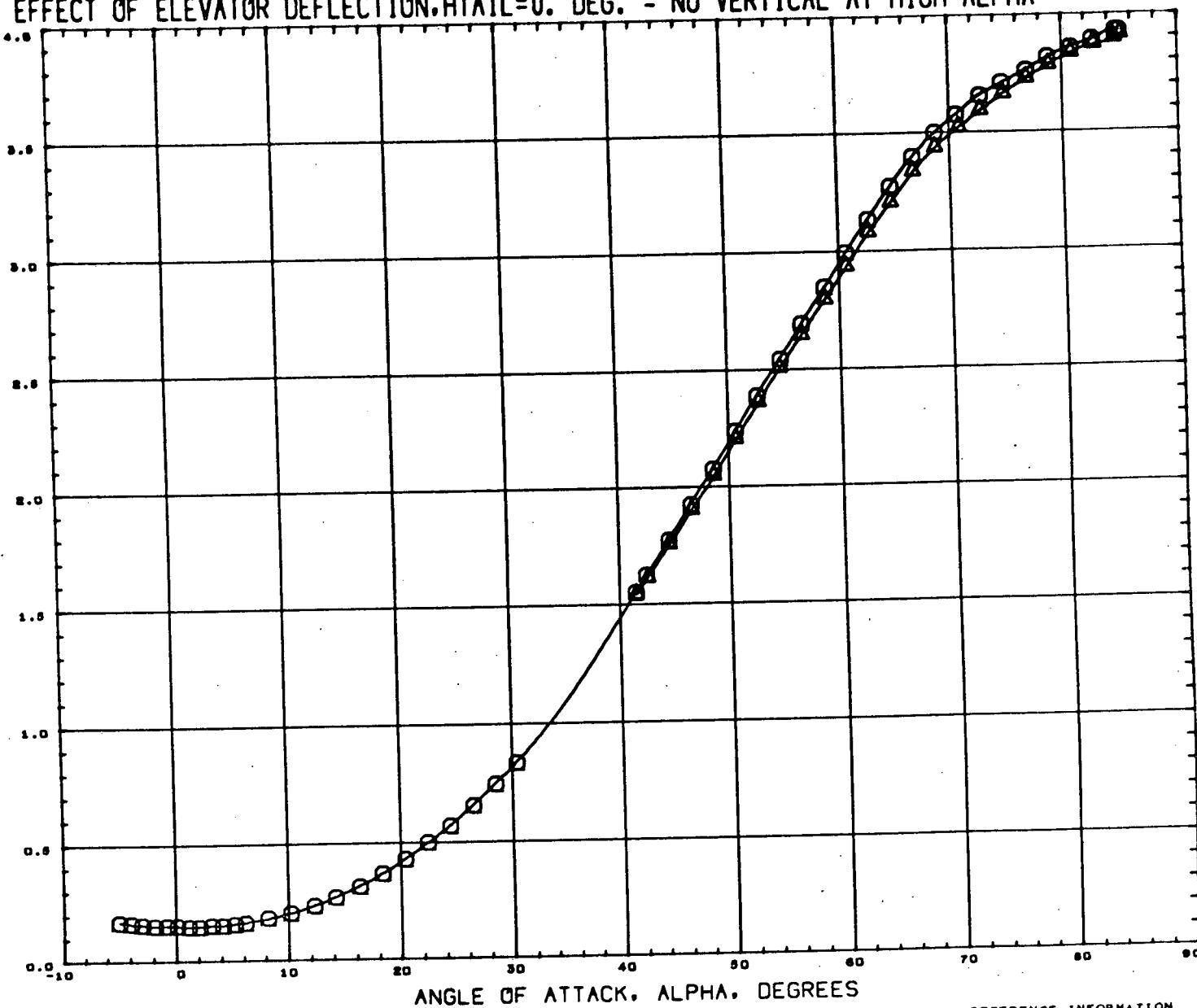
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 XMRP 7.0210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.3870 INCHES
 SCALE 0.4348 PERCENT

MACH 8.120

PAGE 19

EFFECT OF ELEVATOR DEFLECTION, HTAIL=0. DEG. - NO VERTICAL AT HIGH ALPHA

FOREBODY DRAG COEFFICIENT, COF



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX031) GAC HST-02D TBC H-32 BOOSTER B8W4H4V3
 (RCX041) GAC HST-02D TBC H-32 BOOSTER B8W4H4

BETA HTAIL ELEVTR
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 0.000 0.000 -15.000

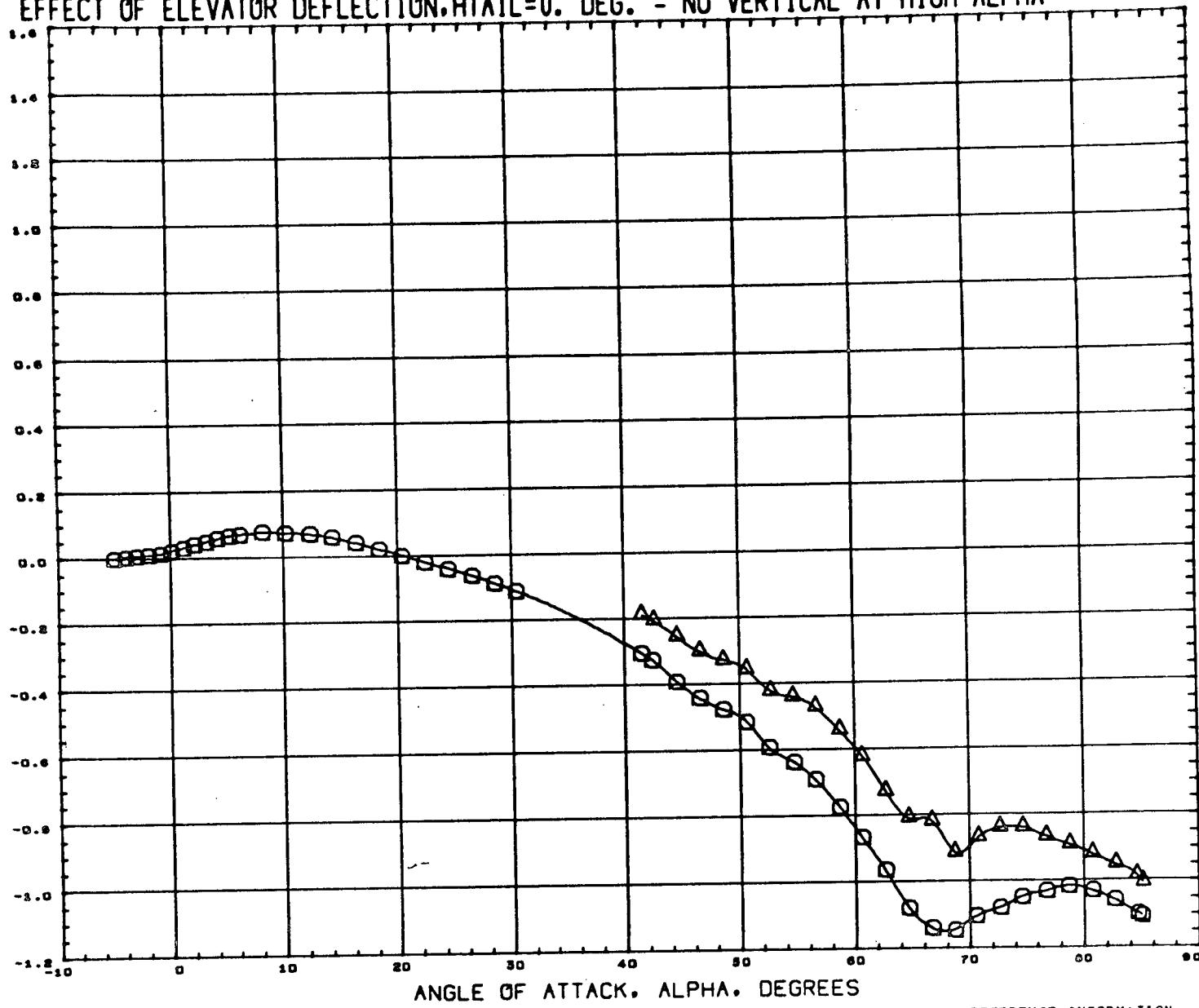
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 XHRP 7.8210 INCHES
 YHRP 0.0000 INCHES
 ZHRP 1.5870 INCHES
 SCALE 0.4348 PERCENT

MACH 8.120

PAGE 20

EFFECT OF ELEVATOR DEFLECTION, HTAIL=0. DEG. - NO VERTICAL AT HIGH ALPHA

PITCHING MOMENT COEFFICIENT, CLM



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCXD31) Q GAC HST-020 TBC H-32 BOOSTER B6W4H4V3
 (RCXD41) Q GAC HST-020 TBC H-32 BOOSTER B6W4H4

BETA HTAIL ELEVTR.
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 0.000 0.000 -15.000

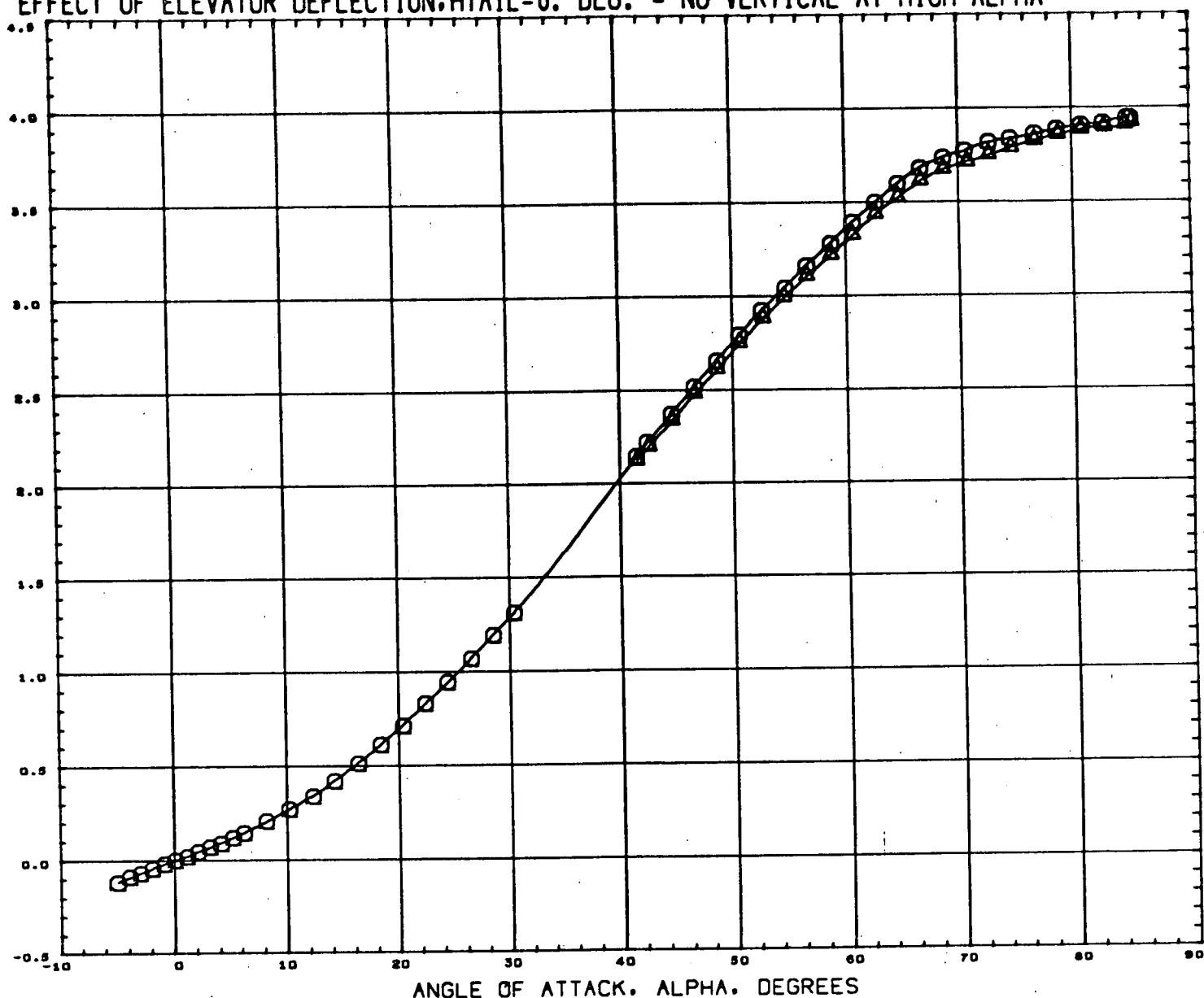
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

PAGE 21

EFFECT OF ELEVATOR DEFLECTION, HTAIL=0, DEG. - NO VERTICAL AT HIGH ALPHA

NORMAL FORCE COEFFICIENT, CN



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX031) Q GAC HST-020 TBC H-32 BOOSTER B6W4H4V3
 (RCX041) Q GAC HST-020 TBC H-32 BOOSTER B6W4H4

BETA HTAIL ELEVTR
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 0.000 0.000 -15.000

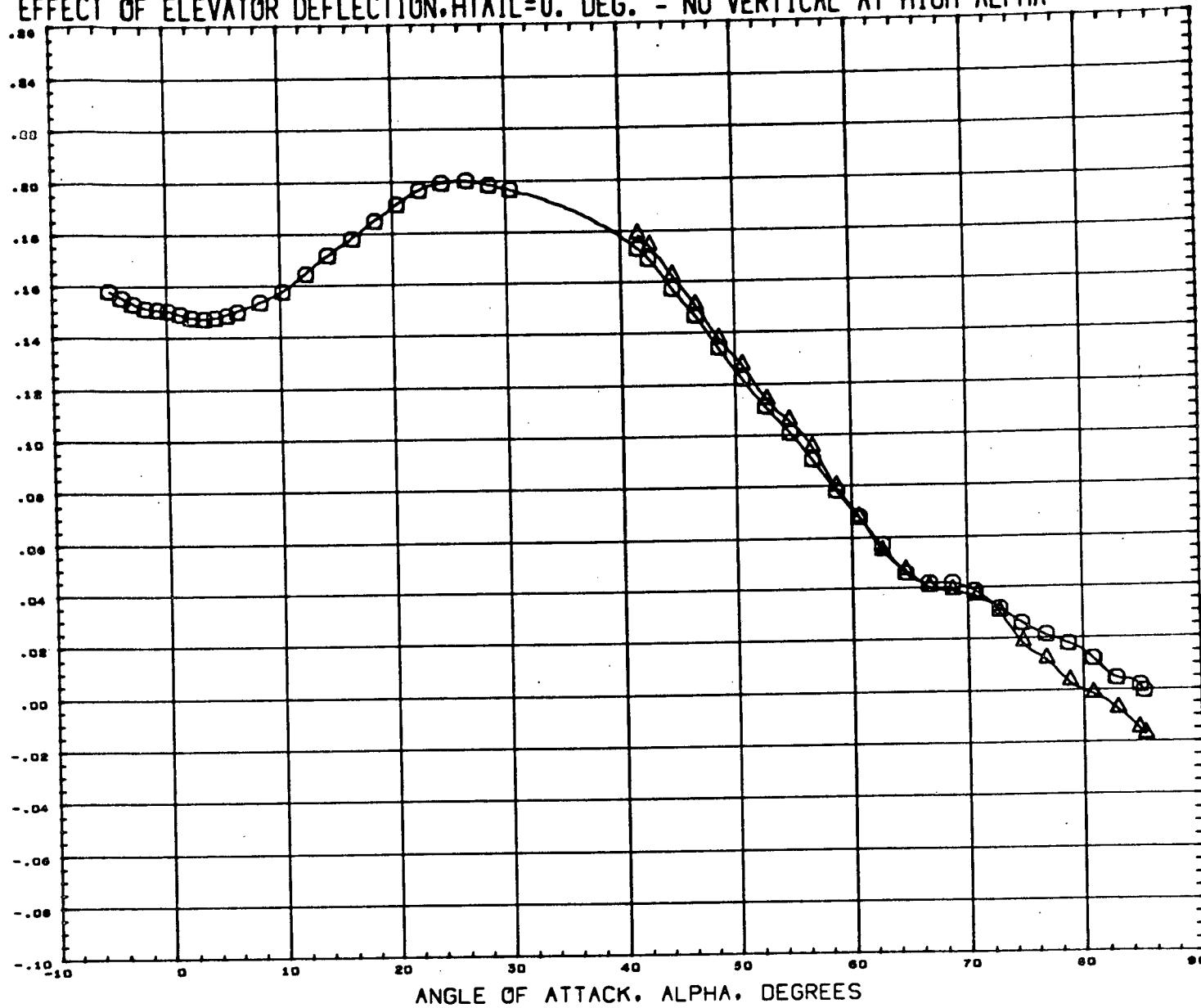
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 BREF 9.6520 INCHES
 XMRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4346 PERCNT

MACH 8.120

PAGE 22

EFFECT OF ELEVATOR DEFLECTION, HTAIL=0. DEG. - NO VERTICAL AT HIGH ALPHA

FOREBODY AXIAL FORCE COEFFICIENT, CAF



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (CCXD31) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCXD41) GAC HST-020 TBC H-32 BOOSTER B6W4H4

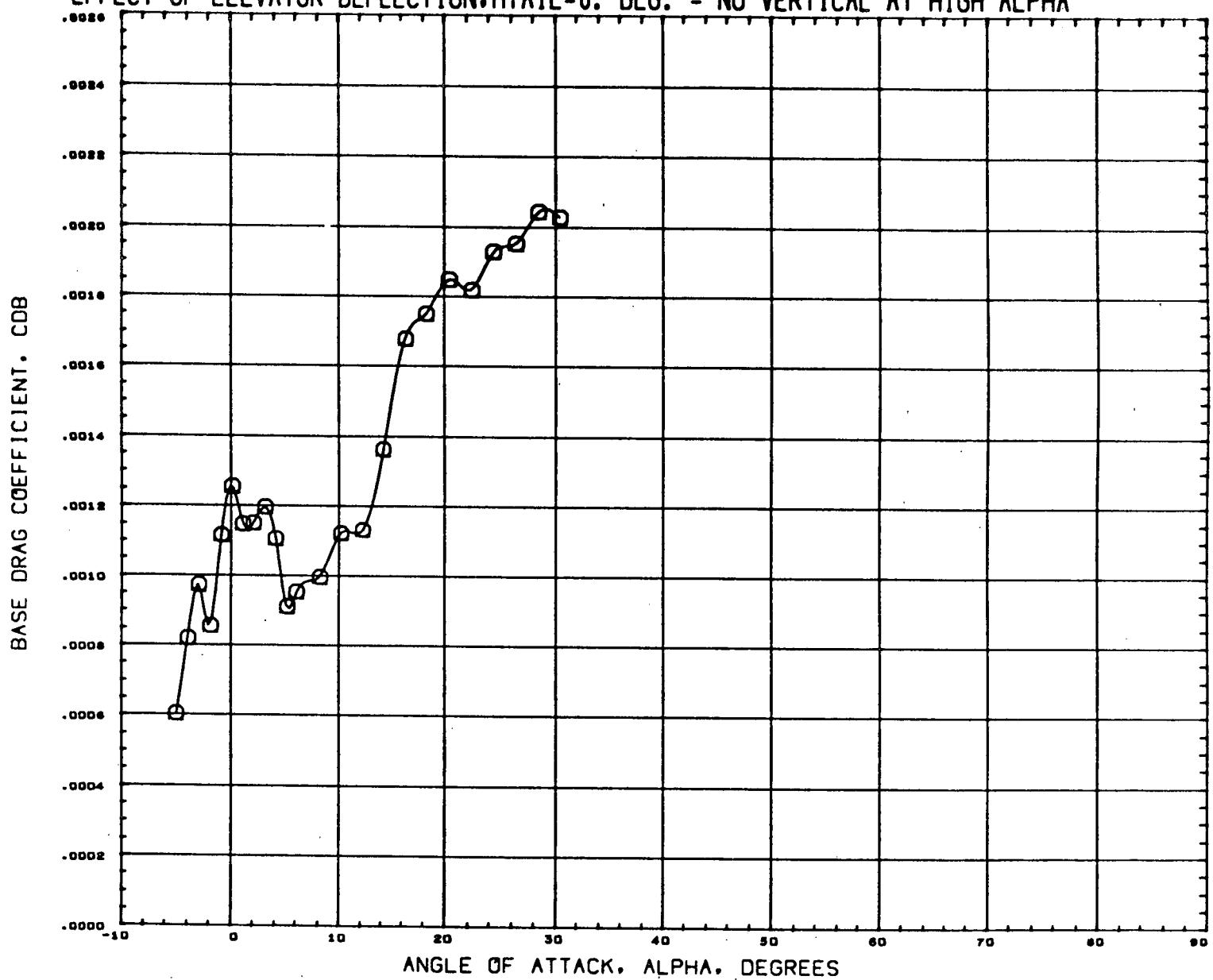
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 0.000 0.000 -15.000

REFERENCE INFORMATION
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 BREF 9.6520 INCHES
 XHRP 7.8210 INCHES
 YHRP 0.0000 INCHES
 ZHRP 1.5670 INCHES
 SCALE 0.4346 PERCENT

MACH 8.120

PAGE 23

EFFECT OF ELEVATOR DEFLECTION. HTAIL=0. DEG. - NO VERTICAL AT HIGH ALPHA



SYMBOL MACH PARAMETRIC VALUES
○ 0.120 BETA 0.000 HTAIL 0.000
 ELEVTR 0.000

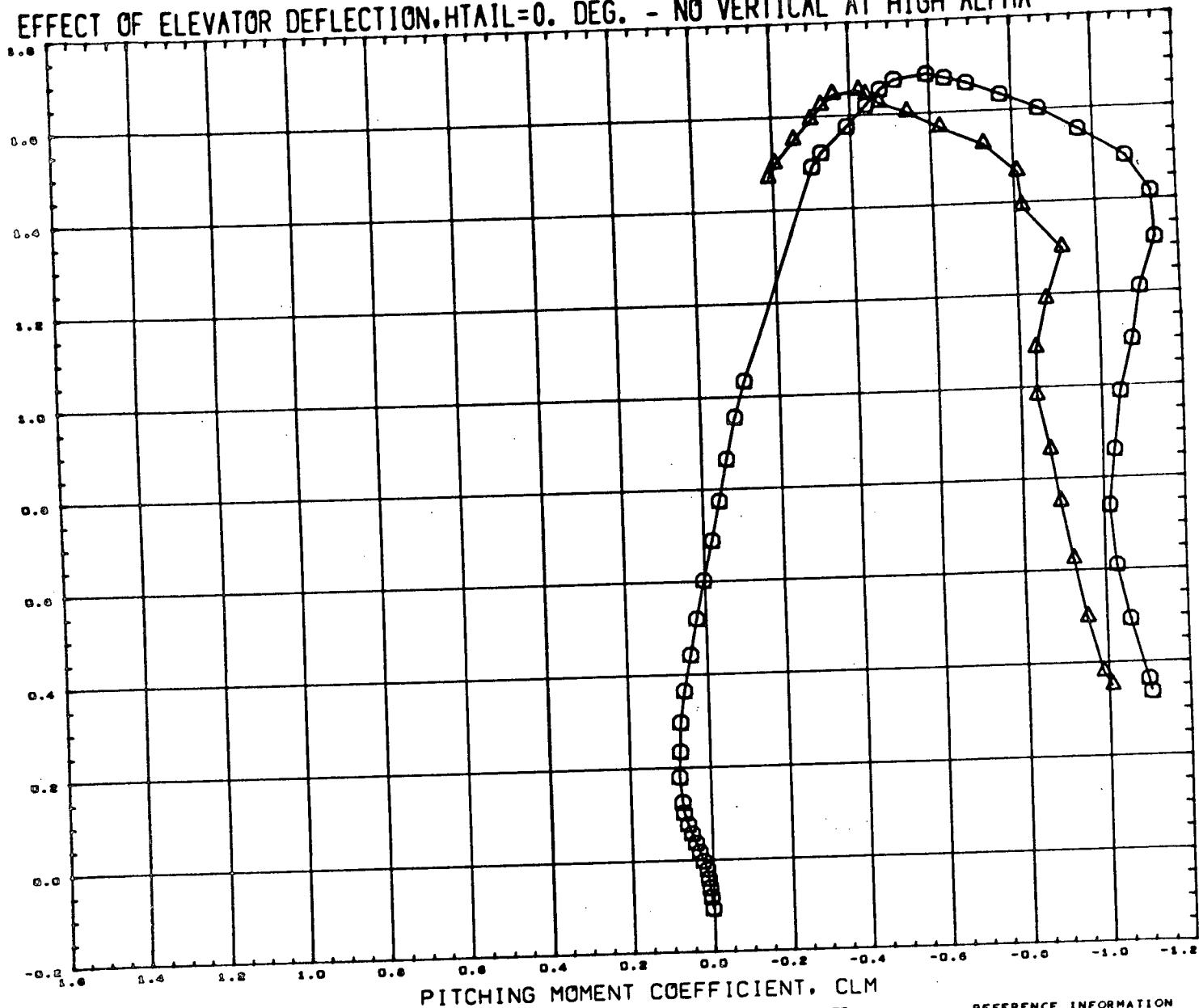
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BREF	9.6520	INCHES
XHPP	7.8210	INCHES
YHPP	0.0000	INCHES
ZHPP	1.5870	INCHES
SCALE	0.4348	PERCNT

EFFECT OF ELEVATOR DEFLECTION, HTAIL=0. DEG. - NO VERTICAL AT HIGH ALPHA

LIFT COEFFICIENT, CL



PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX031) GAC M8T-02D TBC H-32 BOOSTER B6W4H4V3
 (GCX041) GAC M8T-02D TBC H-32 BOOSTER B6W4H4

BETA HTAIL ELEVTR
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 0.000 0.000 -15.000

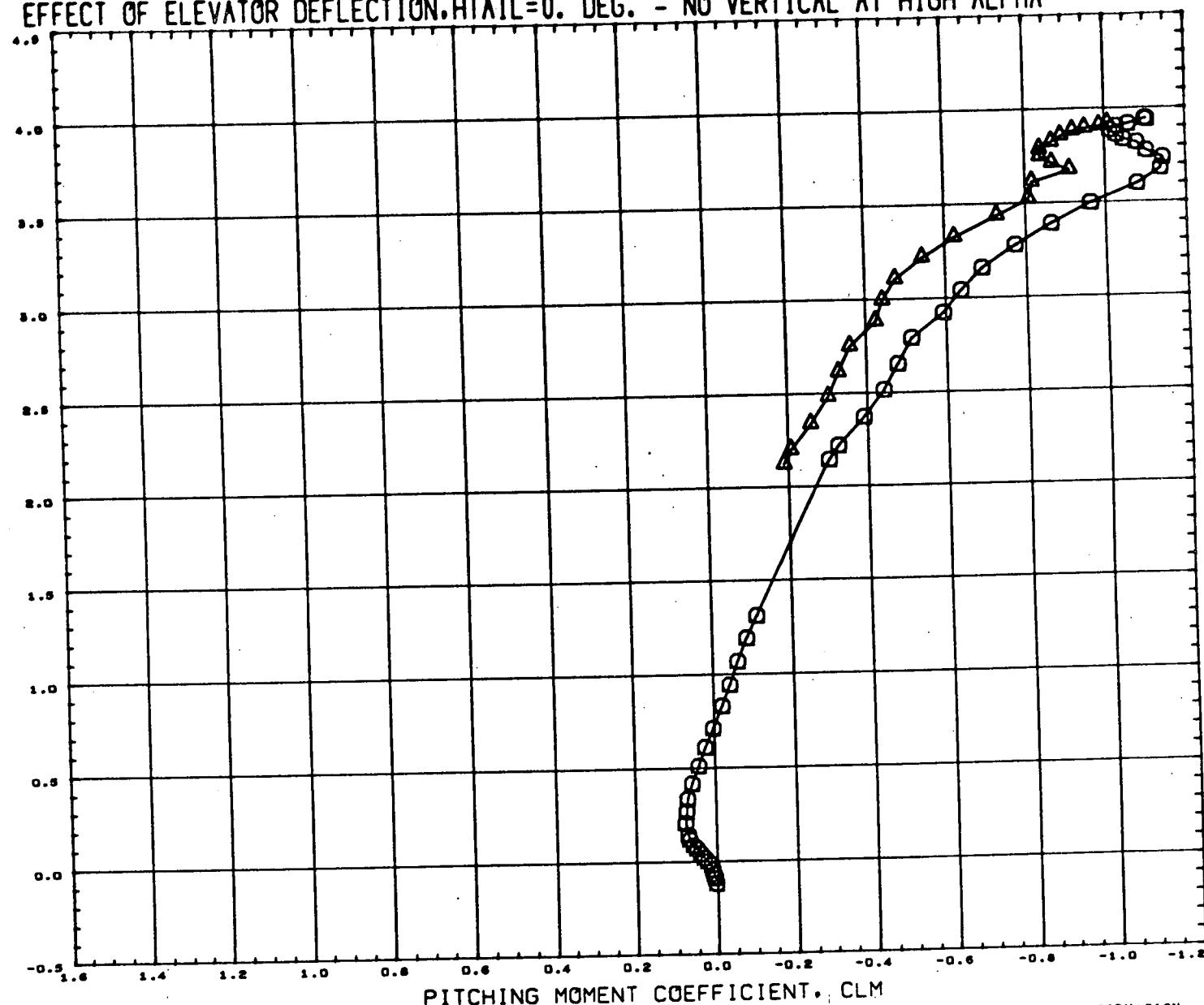
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LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4348	PERCNT

MACH 0.120

PAGE 25

EFFECT OF ELEVATOR DEFLECTION, HTAIL=0. DEG. - NO VERTICAL AT HIGH ALPHA

NORMAL FORCE COEFFICIENT, CN



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCCD31) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCX041) GAC HST-020 TBC H-32 BOOSTER B6W4H4

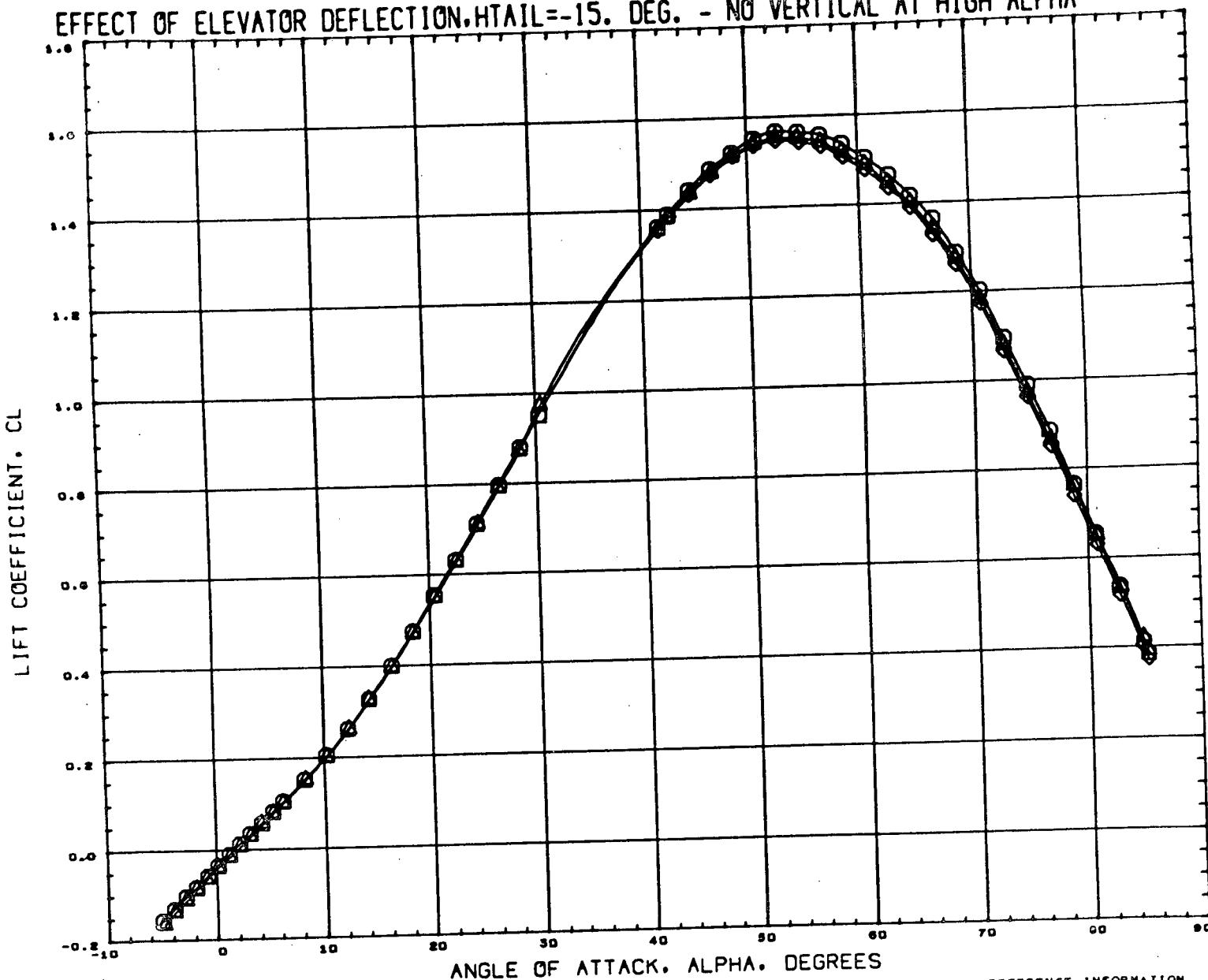
BETA HTAIL ELEVTR
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 0.000 0.000 -15.000

REFERENCE INFORMATION
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

PAGE 26

EFFECT OF ELEVATOR DEFLECTION, HTAIL=-15. DEG. - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX061) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (GCX071) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCX061) GAC HST-020 TBC H-32 BOOSTER B8W4H4

BETA HTAIL ELEVTR
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 0.000 -15.000 -15.000
 0.000 -15.000 -30.000

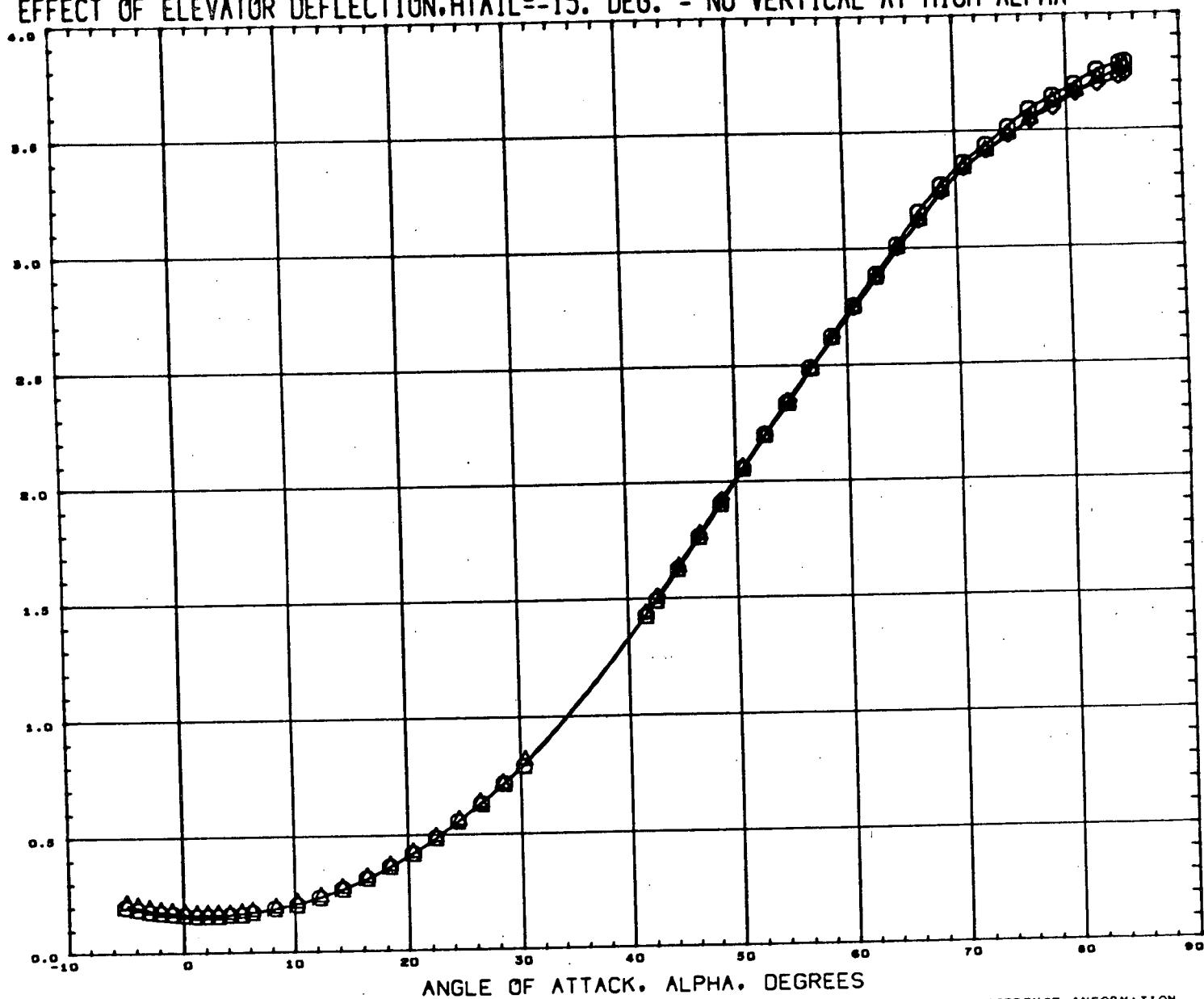
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 BREF 9.6520 INCHES
 XMRP 7.8810 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5670 INCHES
 SCALEZ 0.4348 PERCENT

MACH 8.120

PAGE 27

EFFECT OF ELEVATOR DEFLECTION, HTAIL=-15. DEG. - NO VERTICAL AT HIGH ALPHA

FOREBODY DRAG COEFFICIENT, CDF



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) GAC HST-020 TBC H-32 BOOSTER B6W4H4V3
 (GCX071) GAC HST-020 TBC H-32 BOOSTER B6W4H4V3
 (RCX061) GAC HST-020 TBC H-32 BOOSTER B6W4H4

BETA HTAIL ELEVTR
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 0.000 -15.000 -15.000
 0.000 -15.000 -30.000

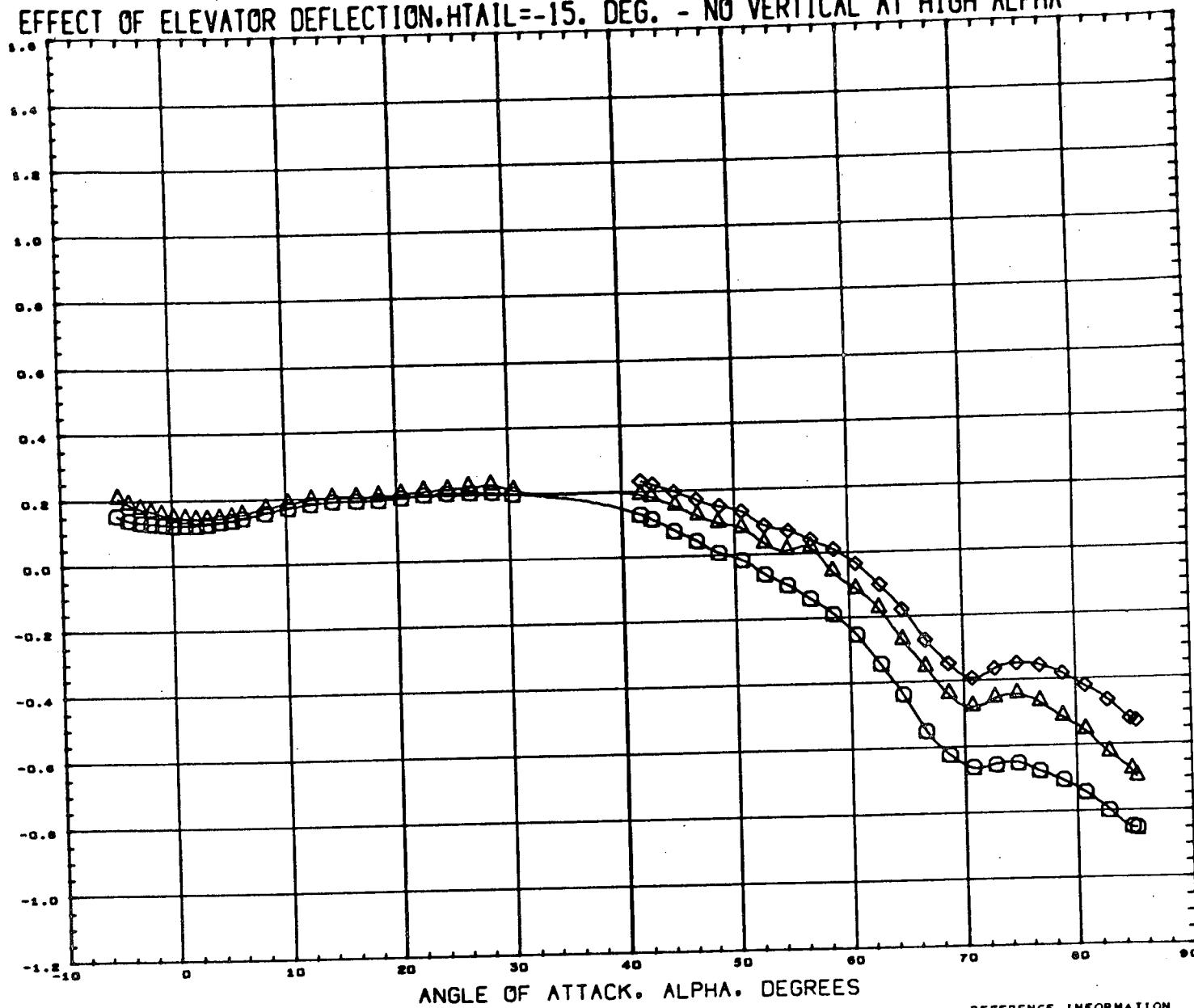
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 6.120

PAGE 28

EFFECT OF ELEVATOR DEFLECTION. HTAIL=-15. DEG. - NO VERTICAL AT HIGH ALPHA

PITCHING MOMENT COEFFICIENT. CLM



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (GCX071) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCX081) GAC HST-020 TBC H-32 BOOSTER B8W4H4

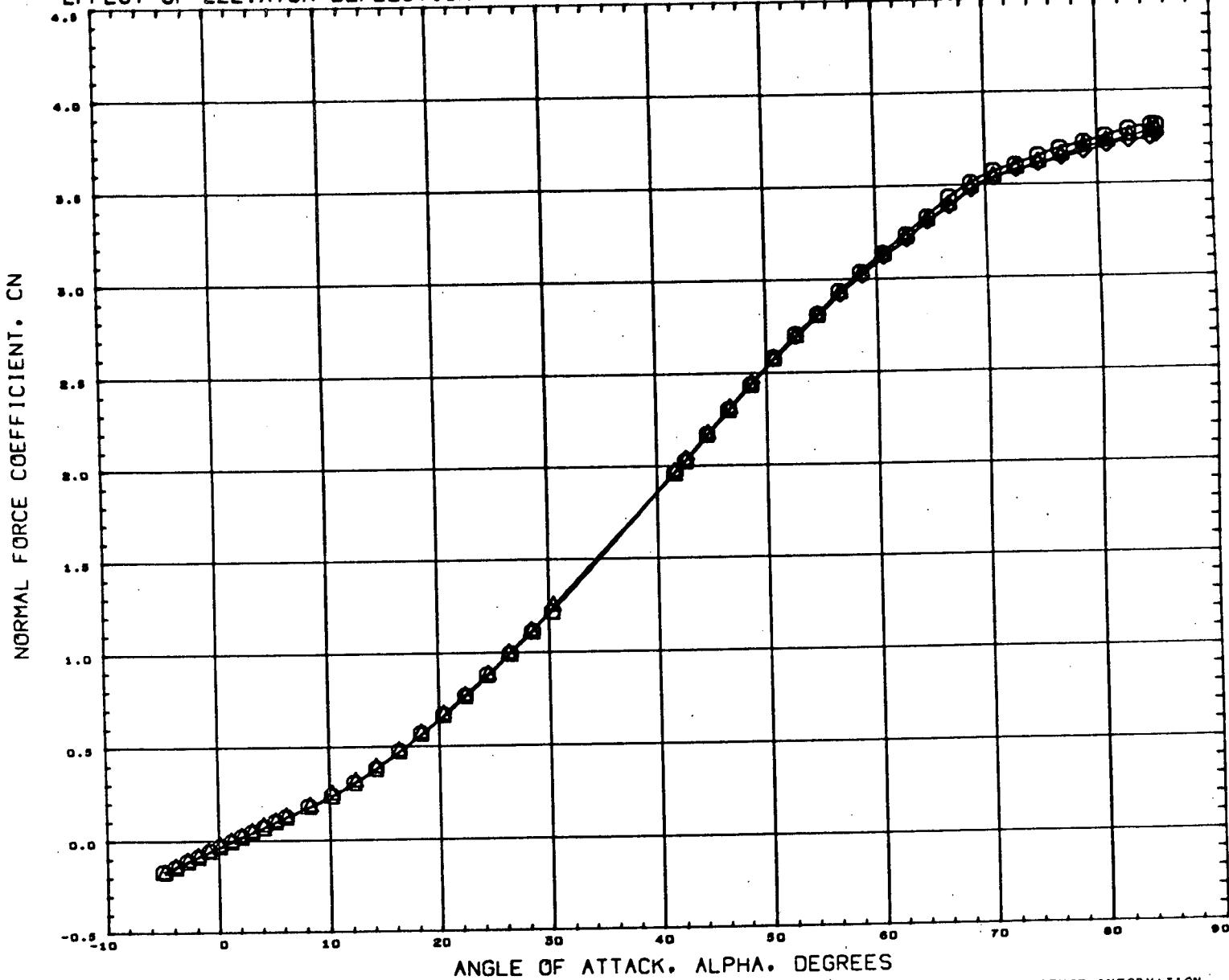
BETA HTAIL ELEVTR
 0.000 -15.000 0.000
 0.000 -15.000 -15.000
 0.000 -15.000 -30.000

REFERENCE INFORMATION
 SREF 13.3440 SQ. IN.
 LREF 1.4680 INCHES
 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.9670 INCHES
 SCALE 0.4348 PERCENT

MACH 6.120

PAGE 29

EFFECT OF ELEVATOR DEFLECTION, HTAIL=-15. DEG. - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCXD01) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (GCXD71) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCXD01) GAC HST-020 TBC H-32 BOOSTER B8W4H4

BETA HTAIL ELEVTR
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 0.000 -15.000 -15.000
 0.000 -15.000 -30.000

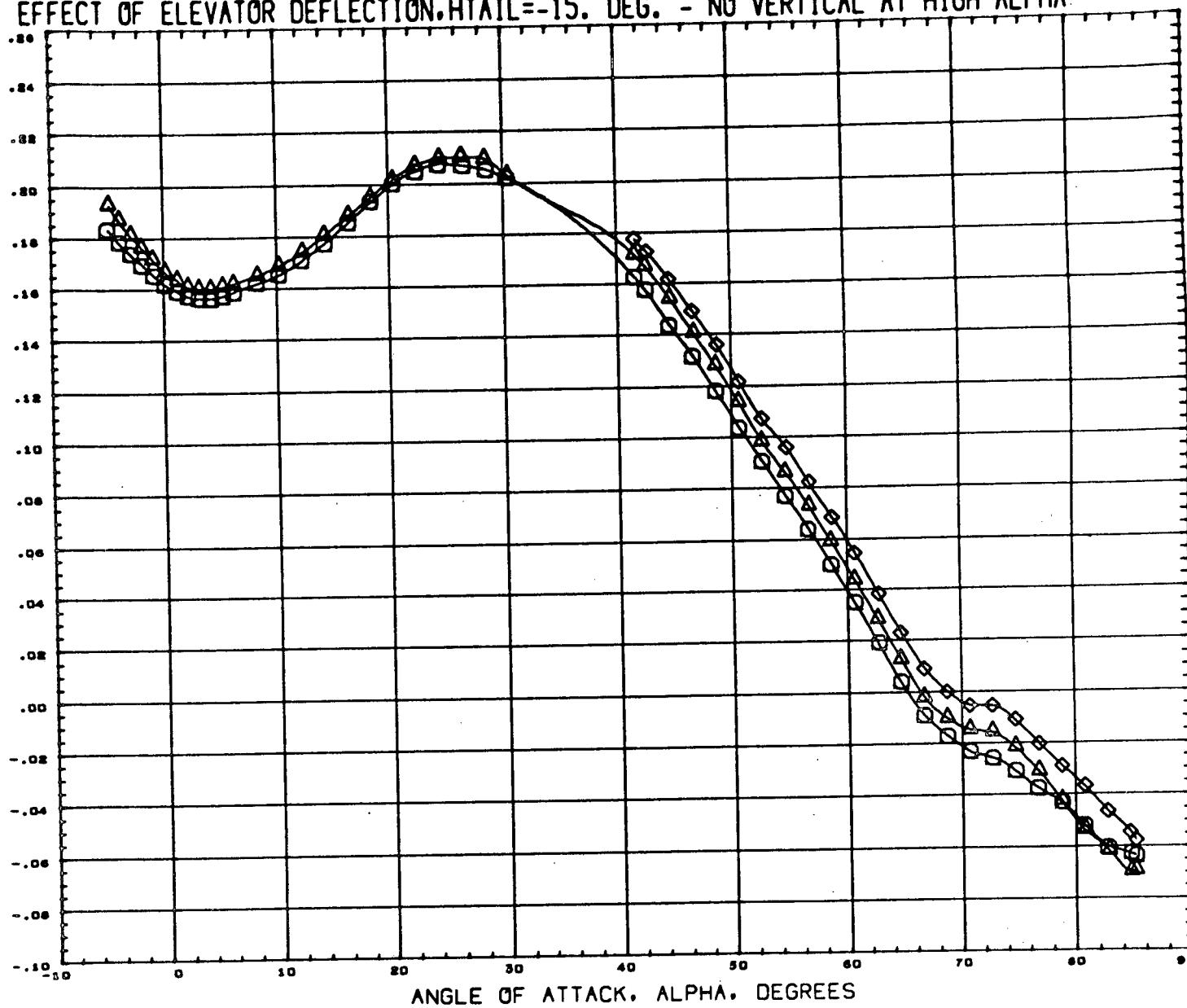
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 BREF 9.6520 INCHES
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 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 0.120

PAGE 30

EFFECT OF ELEVATOR DEFLECTION, HTAIL=-15. DEG. - NO VERTICAL AT HIGH ALPHA

FOREBODY AXIAL FORCE COEFFICIENT, CAF



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX081)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(GCX071)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX061)	GAC HST-020 TBC H-32 BOOSTER B8W4H4

BETA	HTAIL	ELEVTR
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0.000	-15.000	-15.000
0.000	-15.000	-30.000

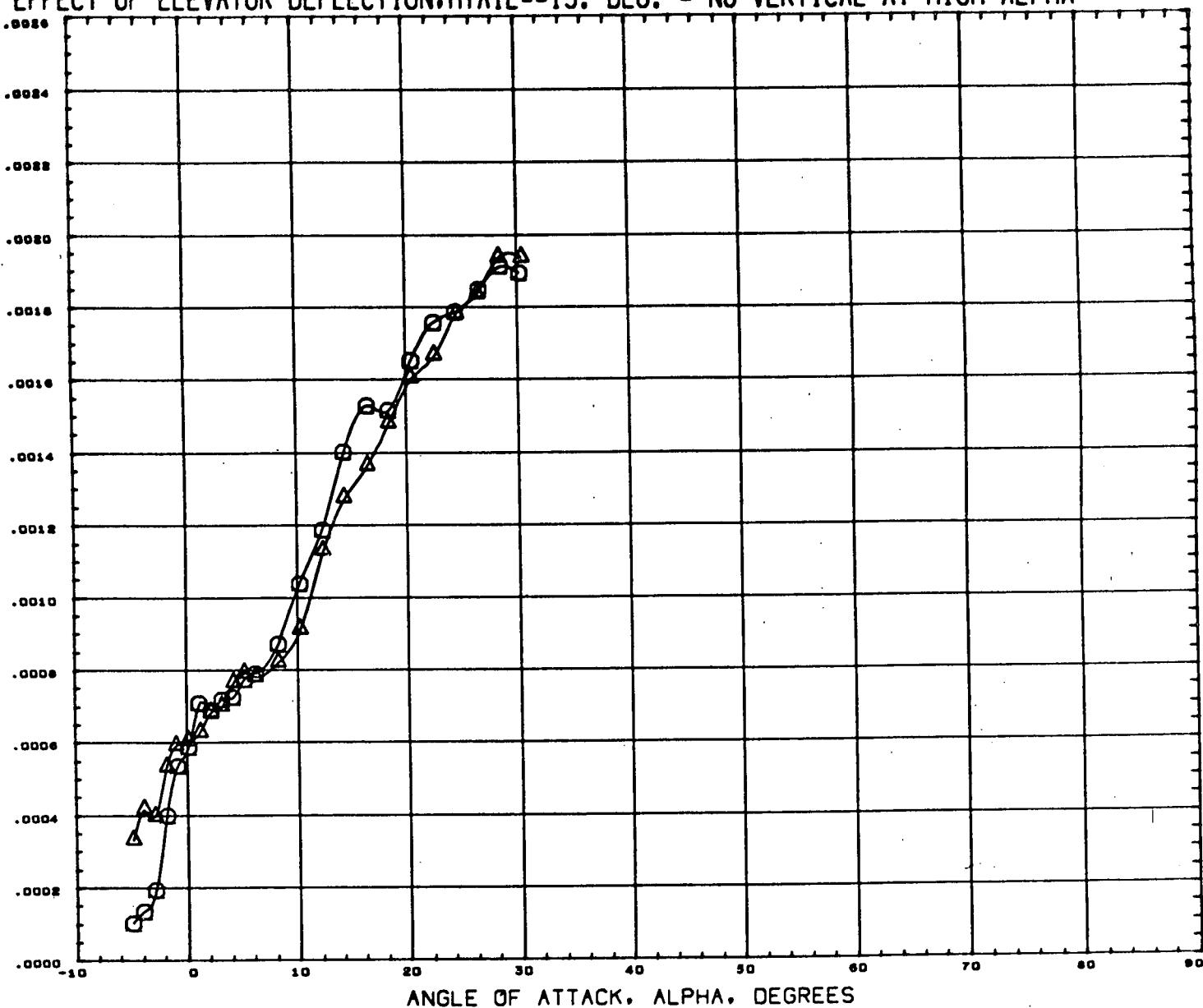
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XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.3870	INCHES
SCALE	0.4348	PERCNT

MACH 8.120

PAGE 31

EFFECT OF ELEVATOR DEFLECTION, HTAIL=-15. DEG. - NO VERTICAL AT HIGH ALPHA

BASE DRAG COEFFICIENT, CDB



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX222) Q GAC MST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX332) Q GAC MST-020 TBC H-32 BOOSTER B8W4H4V3

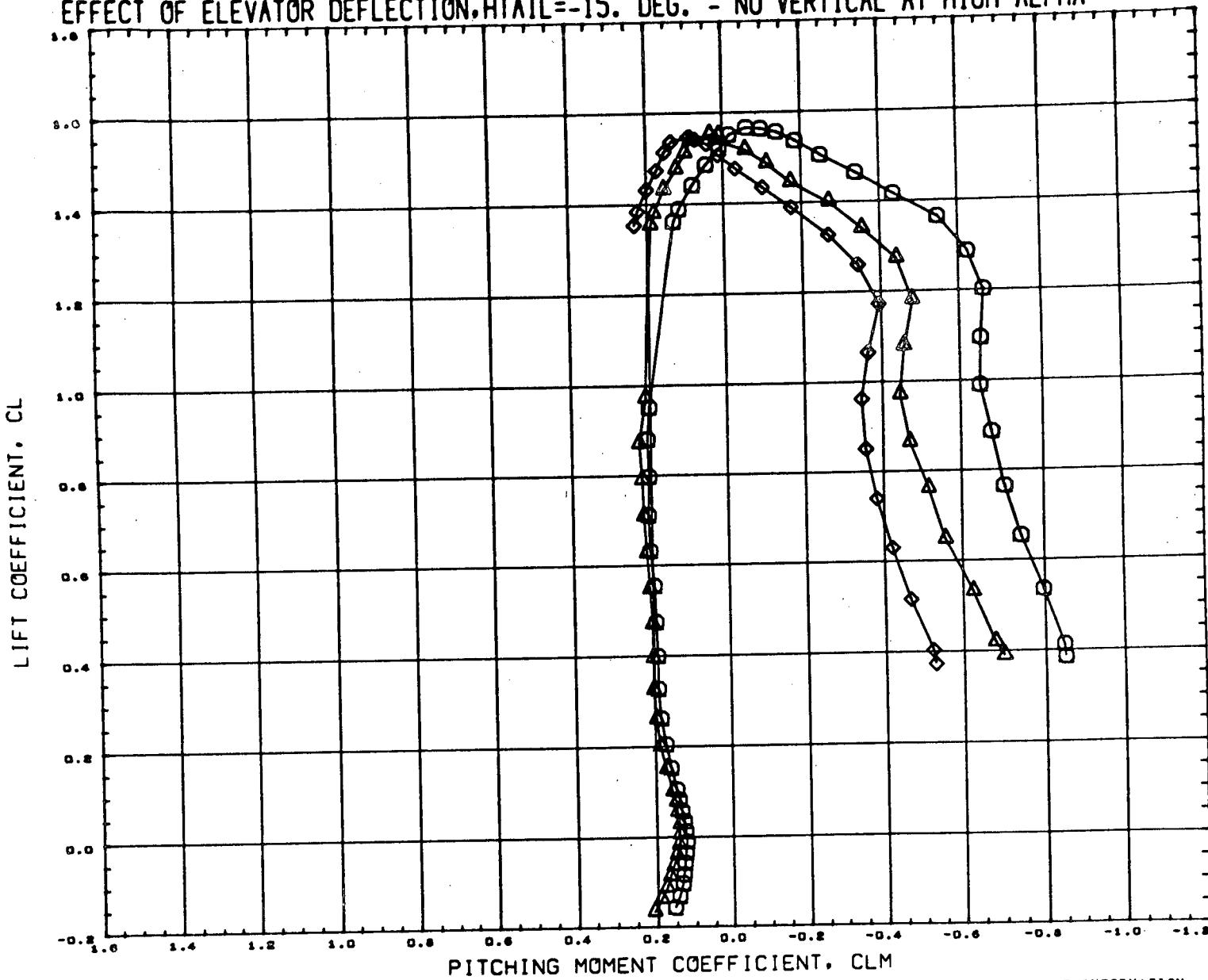
BETA HTAIL ELEVTR
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 0.000 -15.000 -15.000

REFERENCE INFORMATION
 SREF 13.3440 56. IN.
 LREF 1.4680 INCHES
 BREF 9.6520 INCHES
 XMRF 7.8210 INCHES
 YMRF 0.0000 INCHES
 ZMRF 1.5870 INCHES
 SCALE 0.4346 PERCNT

MACH 0.120

PAGE 32

EFFECT OF ELEVATOR DEFLECTION, HTAIL=-15. DEG. - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(GCX061)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(GCX071)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX061)	GAC HST-020 TBC H-32 BOOSTER B8W4H4

BETA	HTAIL	ELEVTR
0.000	-15.000	0.000
0.000	-15.000	-15.000
0.000	-15.000	-30.000

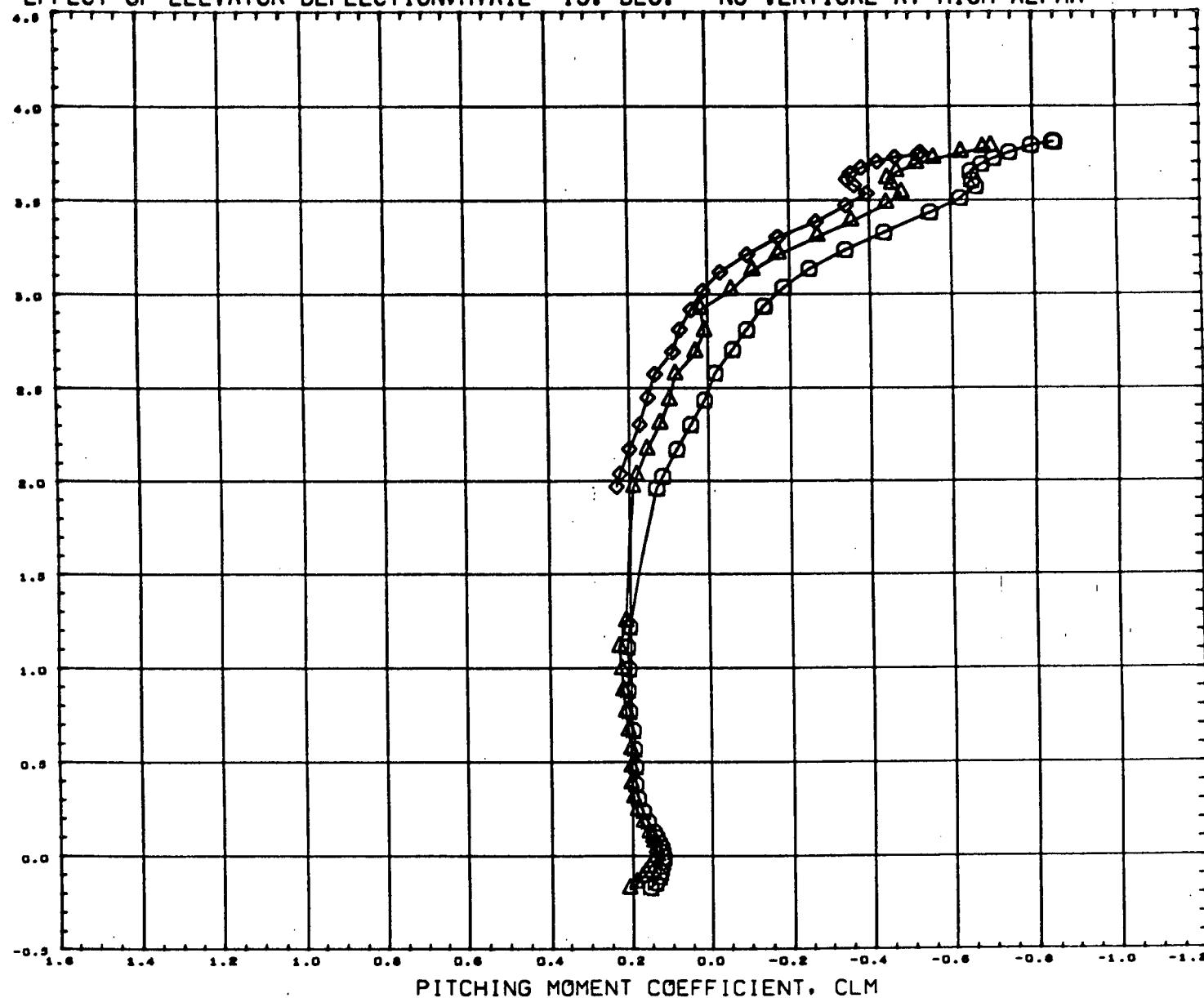
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BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.9670 INCHES
SCALE 0.4348 PERCNT

MACH 6.120

PAGE 33

EFFECT OF ELEVATOR DEFLECTION, HTAIL=-15. DEG. - NO VERTICAL AT HIGH ALPHA

NORMAL FORCE COEFFICIENT, CN



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX051) GAC HST-02D TBC H-32 BOOSTER B8W4H4V3
 (GCX071) GAC HST-02D TBC H-32 BOOSTER B8W4H4V3
 (RCX061) GAC HST-02D TBC H-32 BOOSTER B6W4H4

BETA HTAIL ELEVTR
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 0.000 -15.000 -15.000
 0.000 -15.000 -30.000

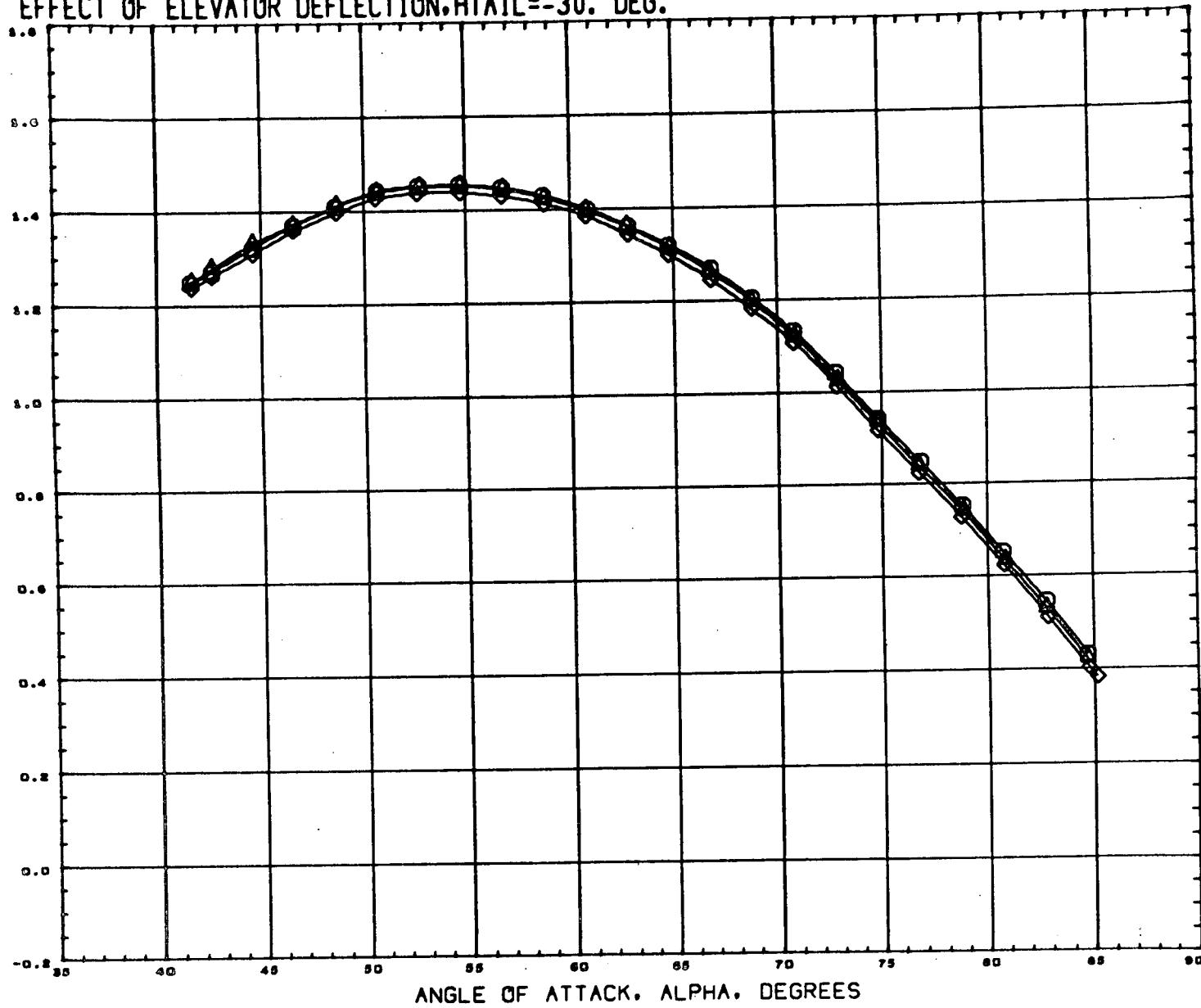
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

PAGE 34

EFFECT OF ELEVATOR DEFLECTION, HTAIL=-30. DEG.

LIFT COEFFICIENT, CL



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCX091)	GAC HST-D20 TBC M-32 BOOSTER B6W4H4
(RCX101)	GAC HST-D20 TBC M-32 BOOSTER B6W4H4
(RCX111)	GAC HST-D20 TBC M-32 BOOSTER B6W4H4

BETA	HTAIL	ELEVTR
0.000	-30.000	0.000
0.000	-30.000	-15.000
0.000	-30.000	-30.000

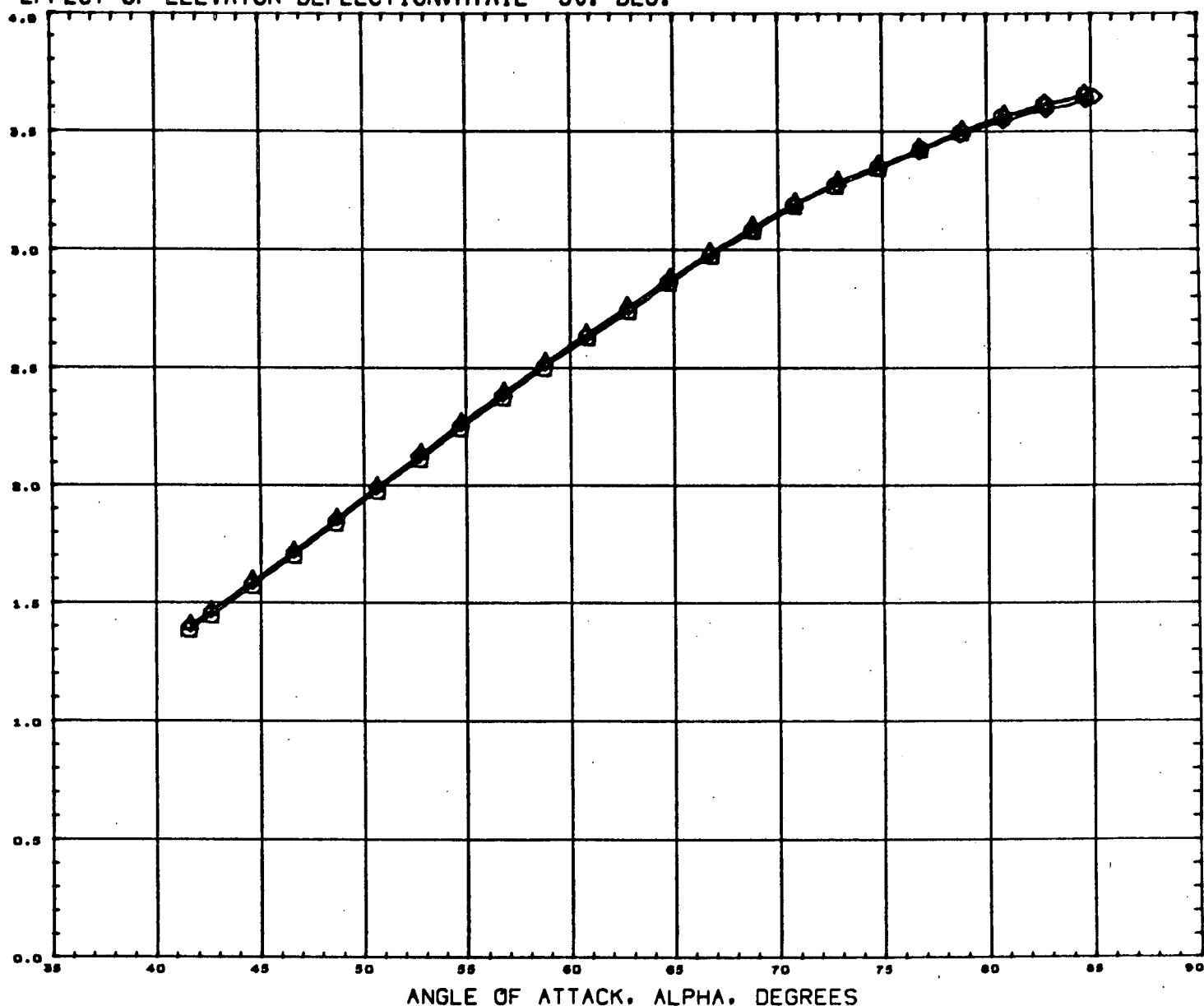
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LREF 1.4660 INCHES
BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCENT

MACH 0.120

PAGE 35

EFFECT OF ELEVATOR DEFLECTION. HTAIL=-30. DEG.

FOREBODY DRAG COEFFICIENT. CDF



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RCX091) GAC HST-D2D TBC H-32 BOOSTER B6W4H4
 (RCX101) GAC HST-D2D TBC H-32 BOOSTER B6W4H4
 (RCX111) GAC HST-D2D TBC H-32 BOOSTER B6W4H4

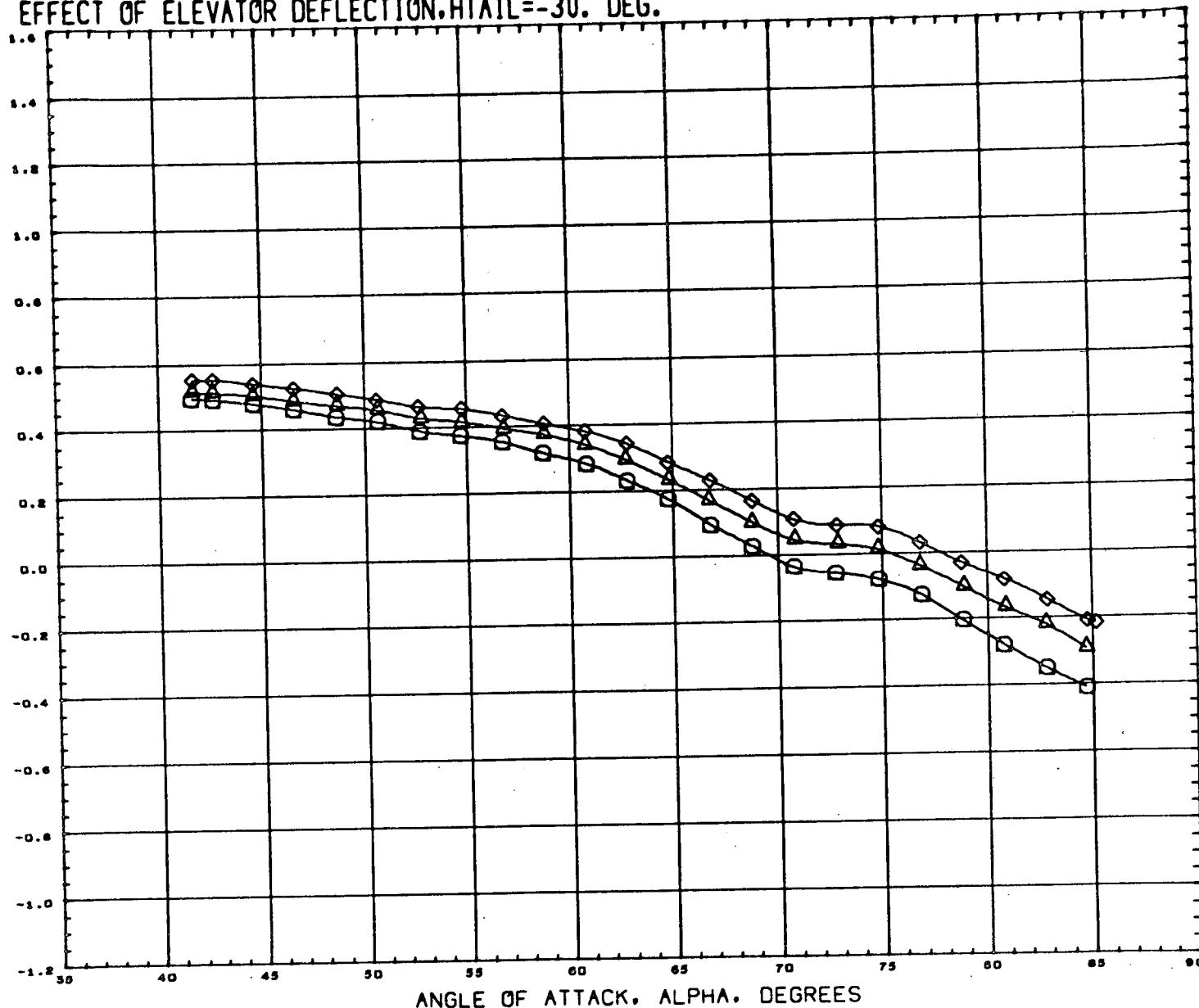
BETA HTAIL ELEVTR
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 0.000 -30.000 -15.000
 0.000 -30.000 -30.000

REFERENCE INFORMATION
 SREF 13.3440 SQ.IN.
 LREF 1.4680 INCHES
 DREF 9.6520 INCHES
 XHRF 7.8210 INCHES
 YHRF 0.0000 INCHES
 ZHRF 1.9870 INCHES
 SCALE 0.4346 PERCNT

MACH 8.120

EFFECT OF ELEVATOR DEFLECTION, HTAIL = -30. DEG.

PITCHING MOMENT COEFFICIENT, CLM



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCX091) GAC HST-020 TBC H-32 BOOSTER B6W4H4
 (RCX101) GAC HST-020 TBC H-32 BOOSTER B6W4H4
 (RCX111) GAC HST-020 TBC H-32 BOOSTER B6W4H4

BETA HTAIL ELEVTR

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0.000	-30.000	-15.000
0.000	-30.000	-30.000

REFERENCE INFORMATION

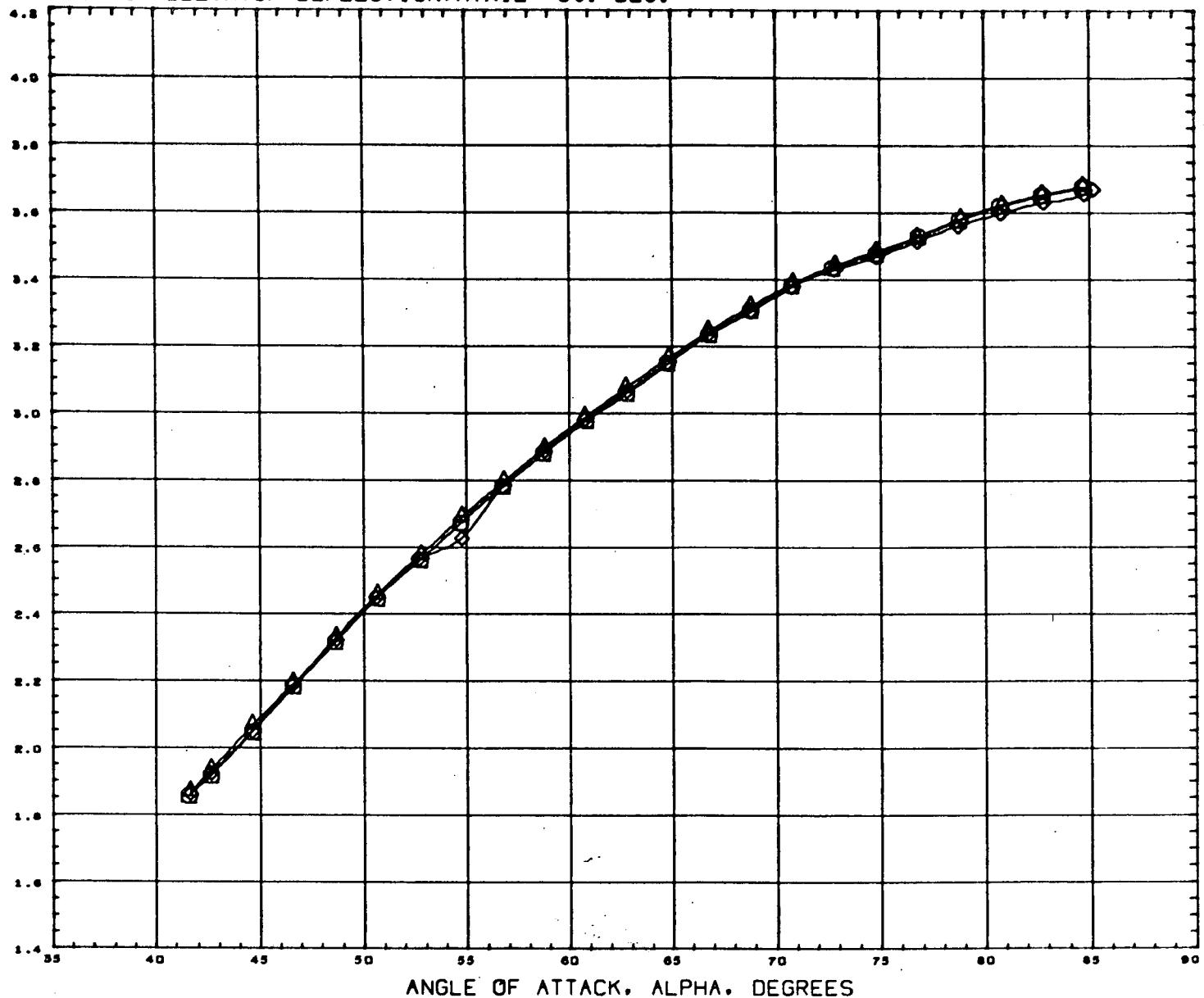
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LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4348	PERCNT

MACH 8.120

PAGE 37

EFFECT OF ELEVATOR DEFLECTION, HTAIL=-30. DEG.

NORMAL FORCE COEFFICIENT, CN



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RCX091) GAC HST-D2D TBC H-32 BOOSTER B6W4H4
 (RCX101) GAC HST-D2D TBC H-32 BOOSTER B6W4H4
 (RCX111) GAC HST-D2D TBC H-32 BOOSTER B6W4H4

BETA HTAIL ELEVTR

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 0.000 -30.000 -15.000
 0.000 -30.000 -30.000

REFERENCE INFORMATION

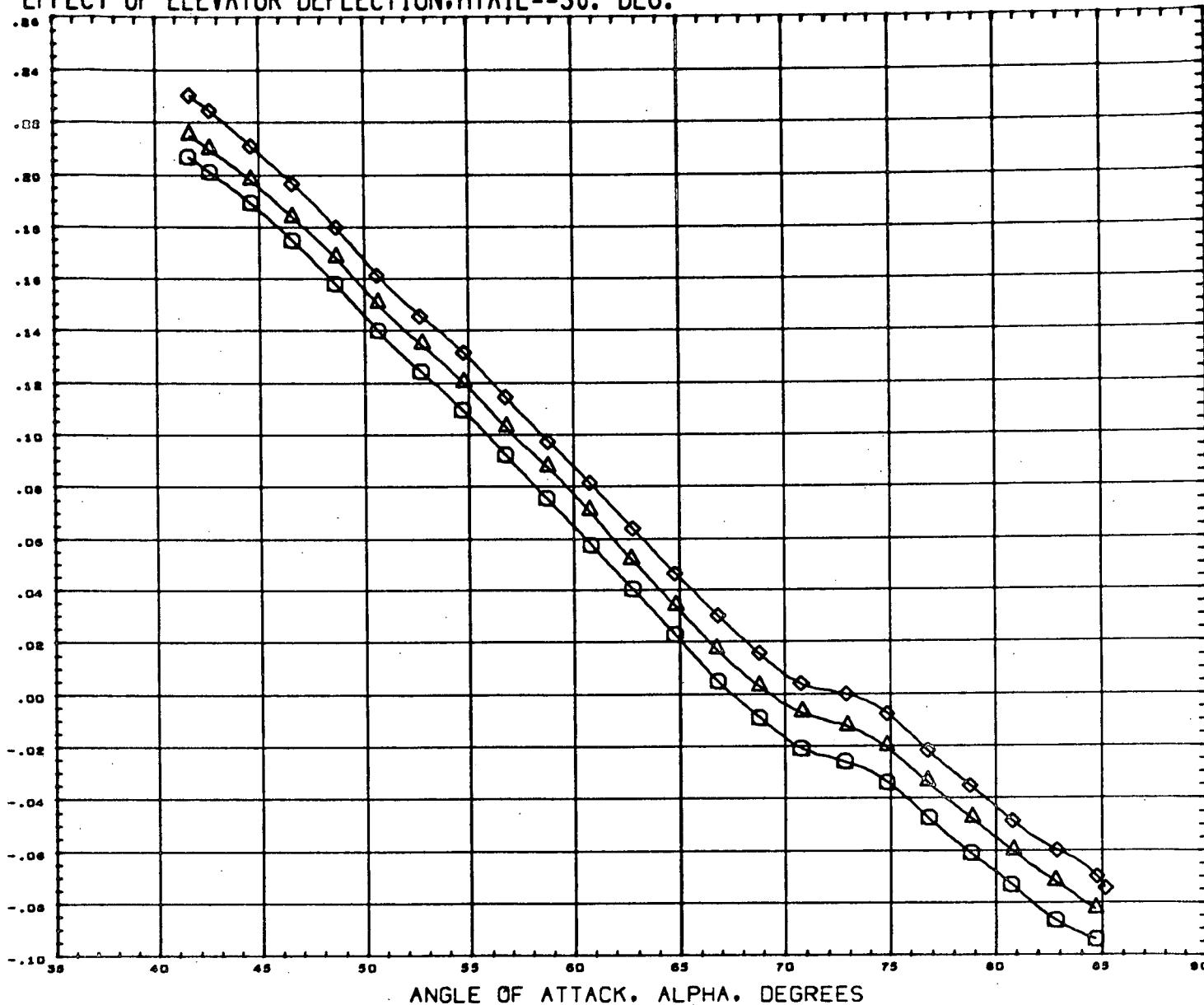
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LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4346	PERCNT

MACH

0.120

EFFECT OF ELEVATOR DEFLECTION, HTAIL = -30. DEG.

FOREBODY AXIAL FORCE COEFFICIENT, CAF



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCX091) GAC HST-020 TBC H-32 BOOSTER B6W4H4
 (RCX101) GAC HST-020 TBC H-32 BOOSTER B6W4H4
 (RCX111) GAC HST-020 TBC H-32 BOOSTER B6W4H4

BETA HTAIL ELEVTR
 0.000 -30.000 0.000
 0.000 -30.000 -15.000
 0.000 -30.000 -30.000

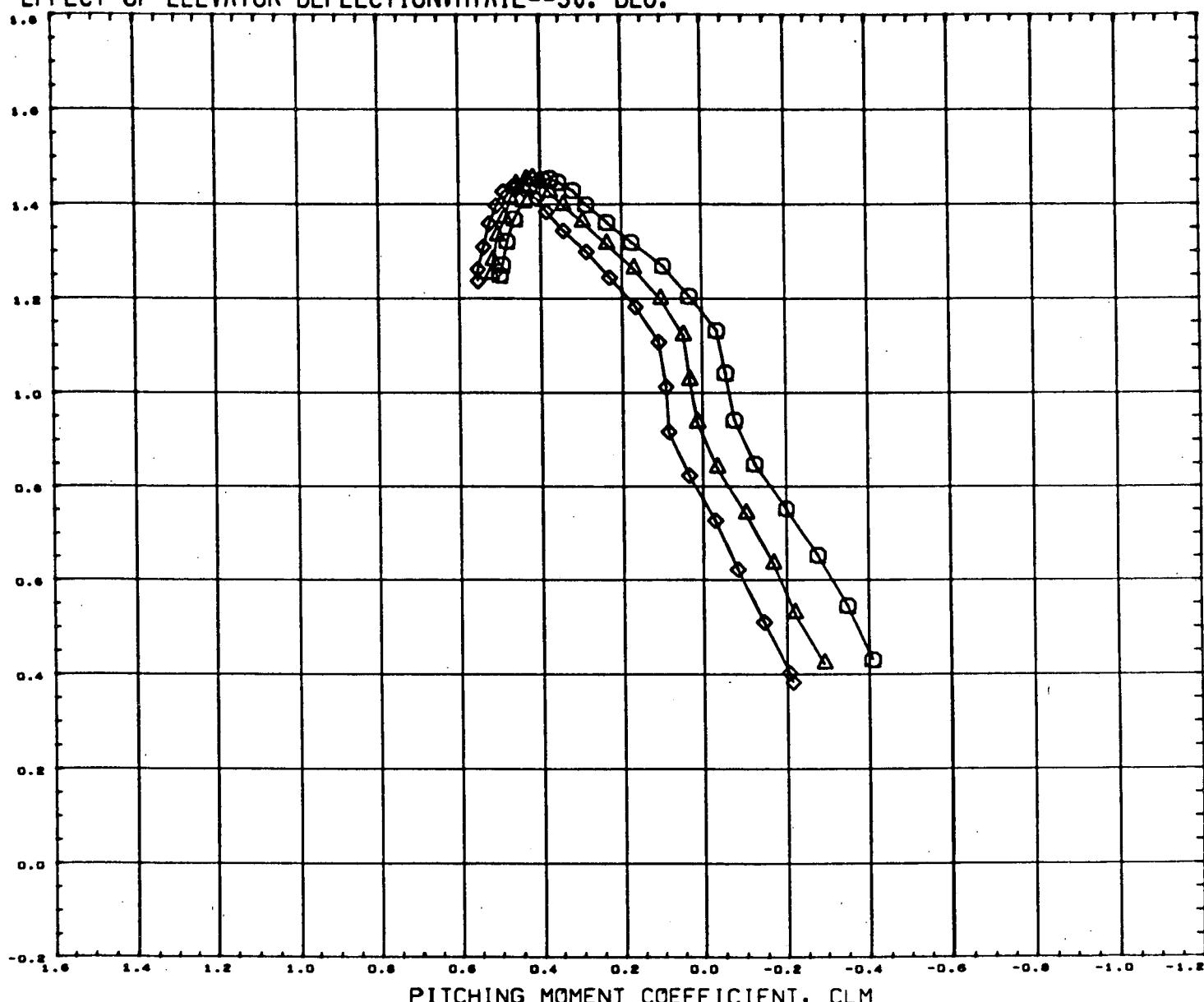
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCENT

MACH 8.120

PAGE 39

EFFECT OF ELEVATOR DEFLECTION, HTAIL=-30. DEG.

LIFT COEFFICIENT, CL



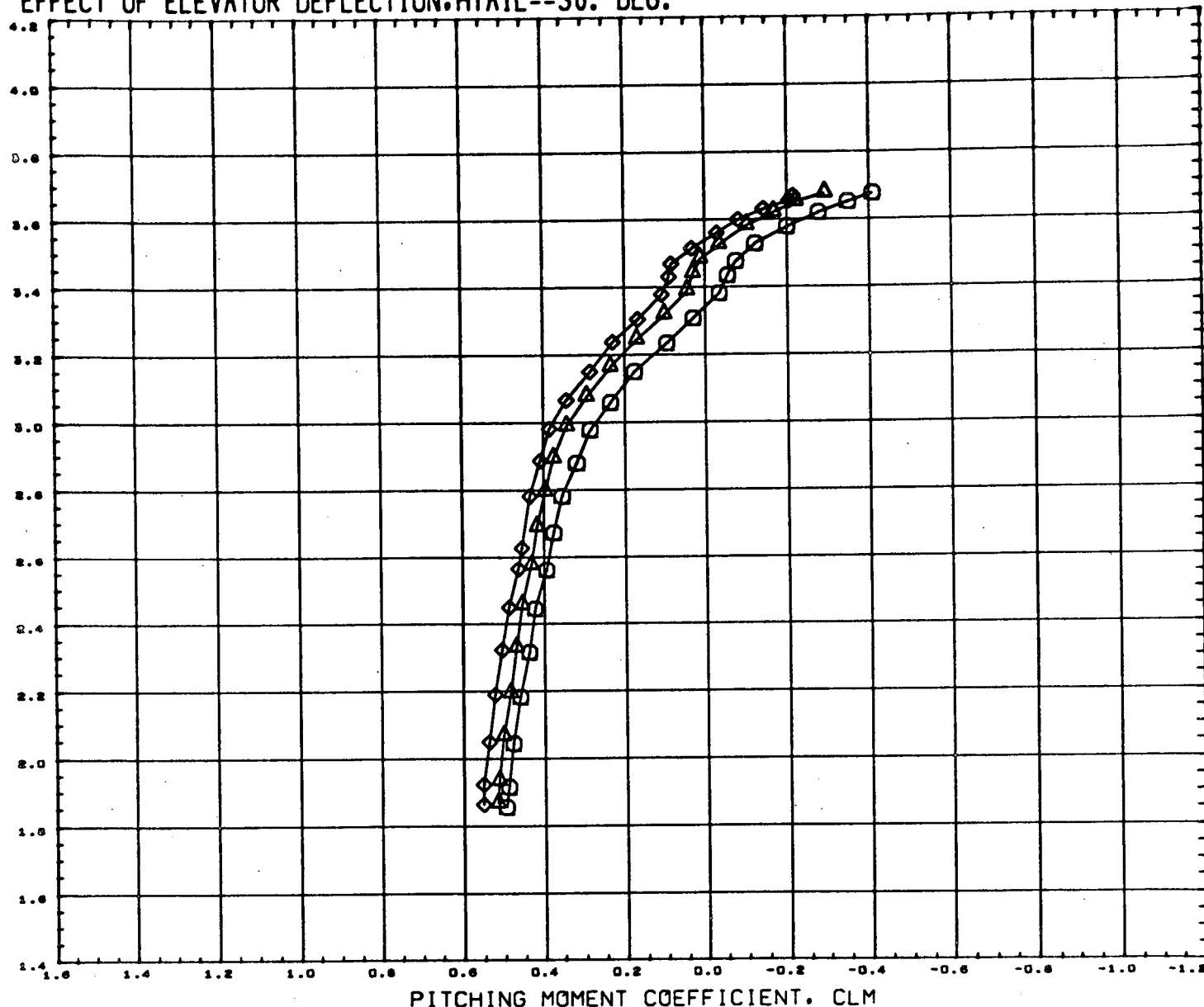
PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	HTAIL	ELEVTR	REFERENCE INFORMATION
(RCX091)	GAC HST-020 TBC H-32 BOOSTER B6W4H4	0.000	-30.000	0.000	SREF 13.3440 SQ. IN.
(RCX101)	GAC HST-020 TBC H-32 BOOSTER B6W4H4	0.000	-30.000	-15.000	LREF 1.4680 INCHES
(RCX111)	GAC HST-020 TBC H-32 BOOSTER B6W4H4	0.000	-30.000	-30.000	BREF 9.6520 INCHES XMRP 7.6210 INCHES YMRP 0.0000 INCHES ZMRP 1.5870 INCHES SCALE 0.4348 PERCENT

MACH 0.120

EFFECT OF ELEVATOR DEFLECTION. HTAIL=-30. DEG.

NORMAL FORCE COEFFICIENT. CN



PITCHING MOMENT COEFFICIENT. CLM

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RCX091) GAC HST-020 TBC H-32 BOOSTER B6W4H4
 (RCX101) GAC HST-020 TBC H-32 BOOSTER B6W4H4
 (RCX111) GAC HST-020 TBC H-32 BOOSTER B6W4H4

BETA HTAIL ELEVTR

0.000 -30.000 0.000
 0.000 -30.000 -15.000
 0.000 -30.000 -30.000

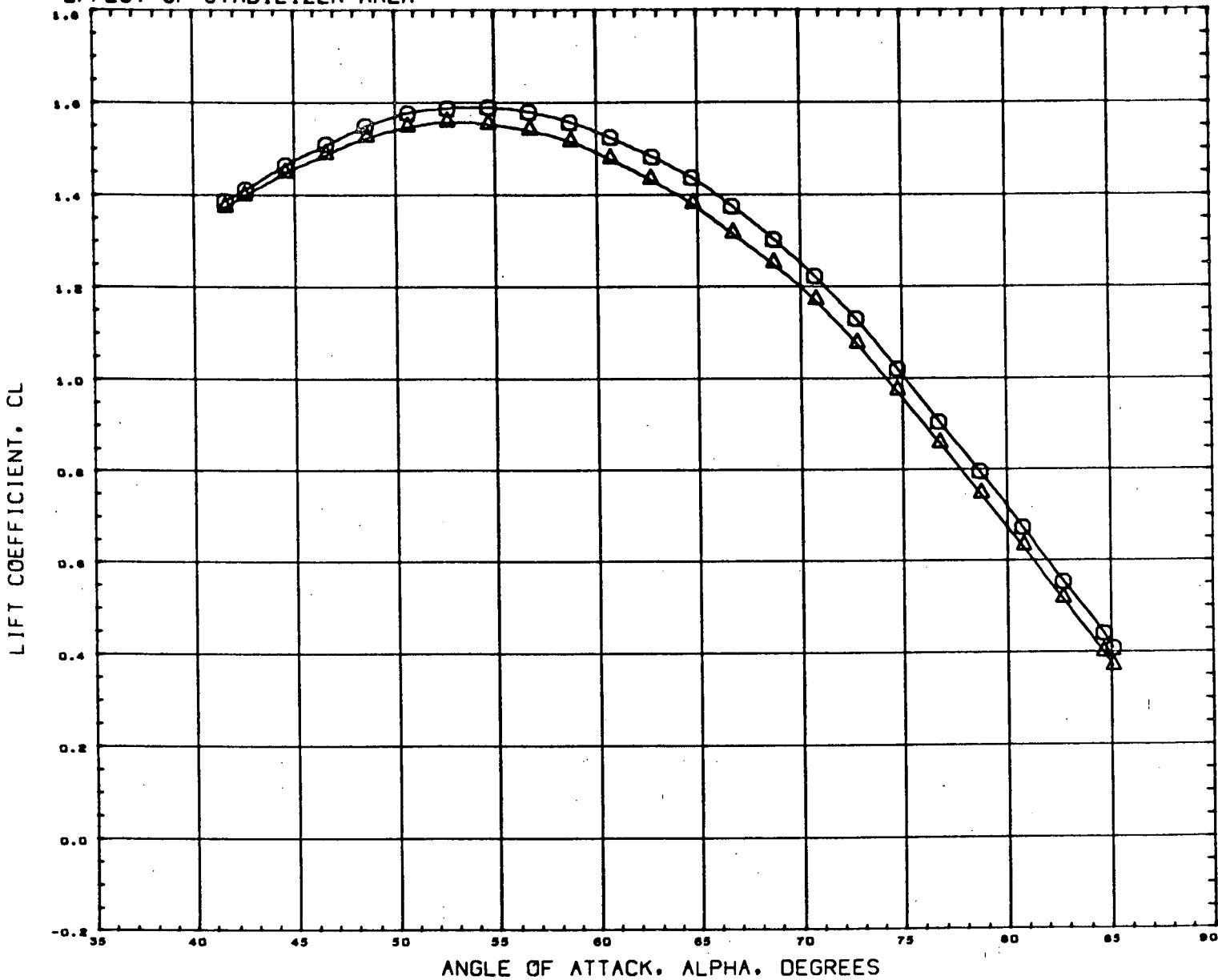
REFERENCE INFORMATION

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 BREF 9.6520 INCHES
 XMRP 7.0210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4340 PERCNT

MACH 8.120

PAGE 41

EFFECT OF STABILIZER AREA



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCX131) GAC HST-D20 TBC H-32 BOOSTER B6W5H4
 (RCX311) GAC HST-D20 TBC H-32 BOOSTER B6W5H5

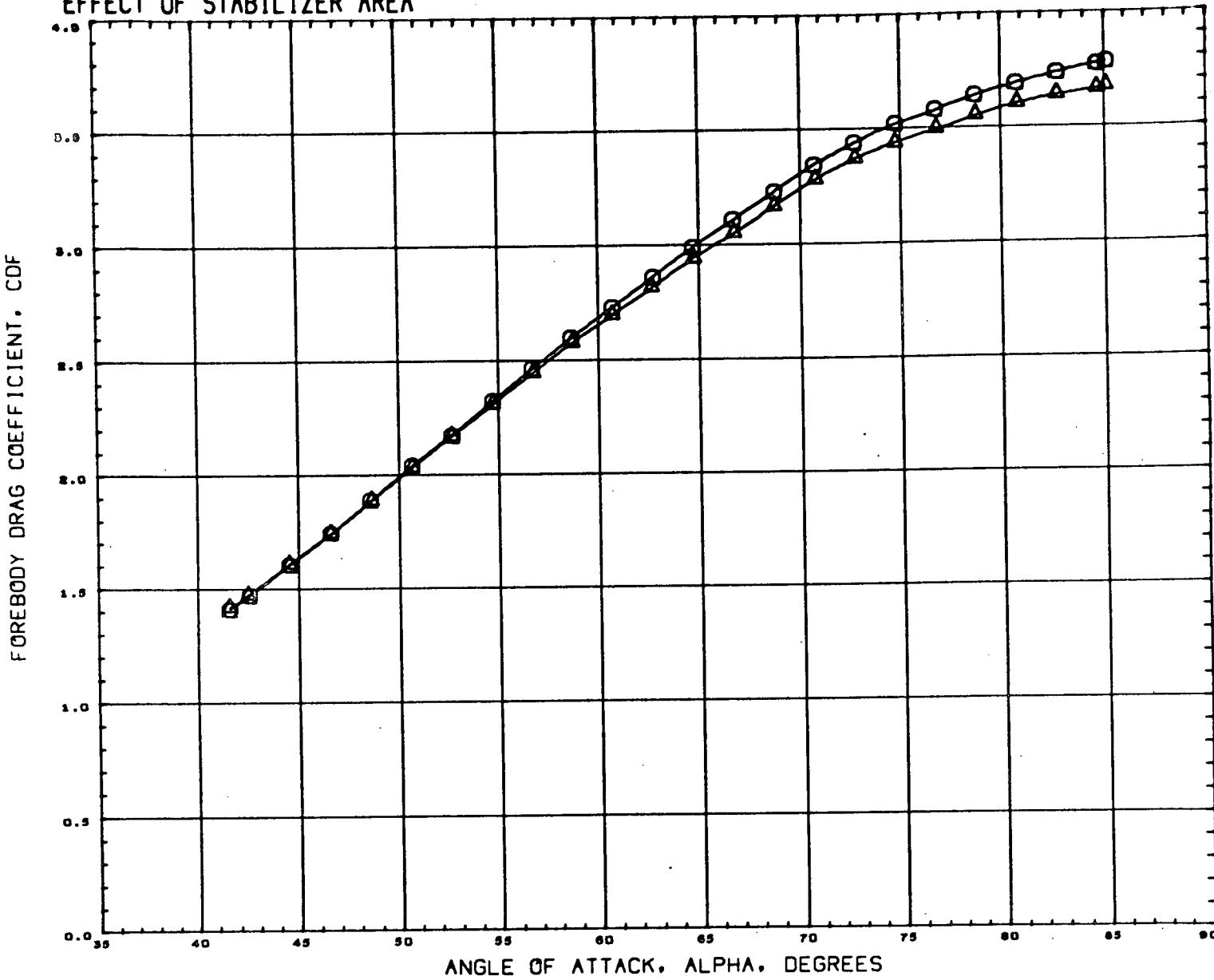
BETA HTAIL ELEVTR
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 0.000 -15.000

REFERENCE INFORMATION
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 BREF 9.6520 INCHES
 XHRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.3670 INCHES
 SCALE 0.4348 PERCNT

MACH 0.120

PAGE 42

EFFECT OF STABILIZER AREA



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RCX131) GAC HST-D2D TBC M-32 BOOSTER B6W5H4
(RCX311) GAC HST-D2D TBC M-32 BOOSTER B6W5H5

BETA NTAIL ELEVTR

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0.000 -15.000

REFERENCE INFORMATION

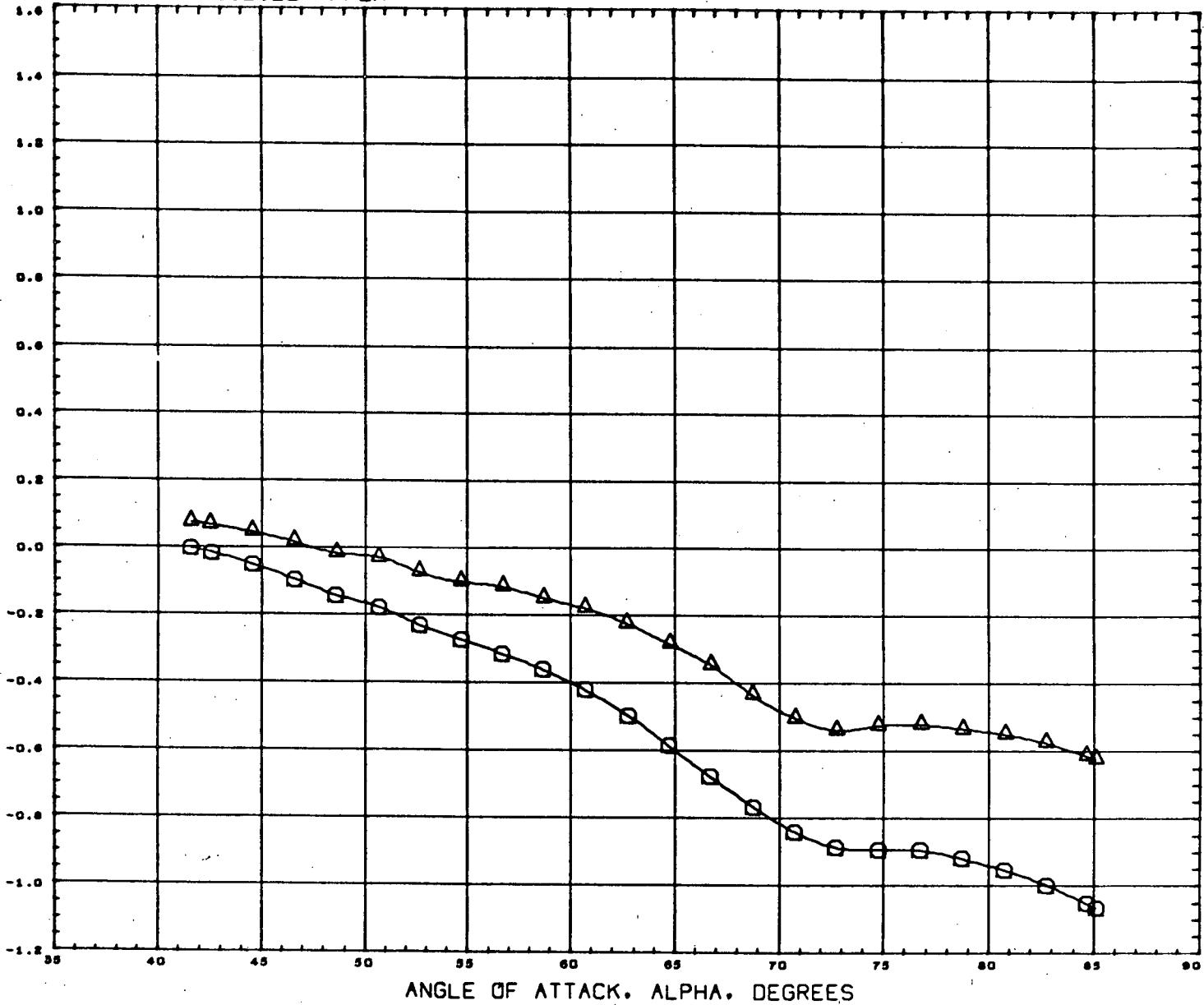
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BREF	9.6520	INCHES
XHRP	7.0210	INCHES
YHRP	0.0000	INCHES
ZHRP	1.9870	INCHES
SCALE	0.4348	PERCENT

MACH 8.120

PAGE 43

EFFECT OF STABILIZER AREA

PITCHING MOMENT COEFFICIENT. CLM



ANGLE OF ATTACK. ALPHA. DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCX131) GAC HST-020 TBC H-32 BOOSTER B6W5H4
 (RCX311) GAC HST-020 TBC H-32 BOOSTER B6W5H5

BETA MTAIL ELEVTR
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 0.000 -15.000

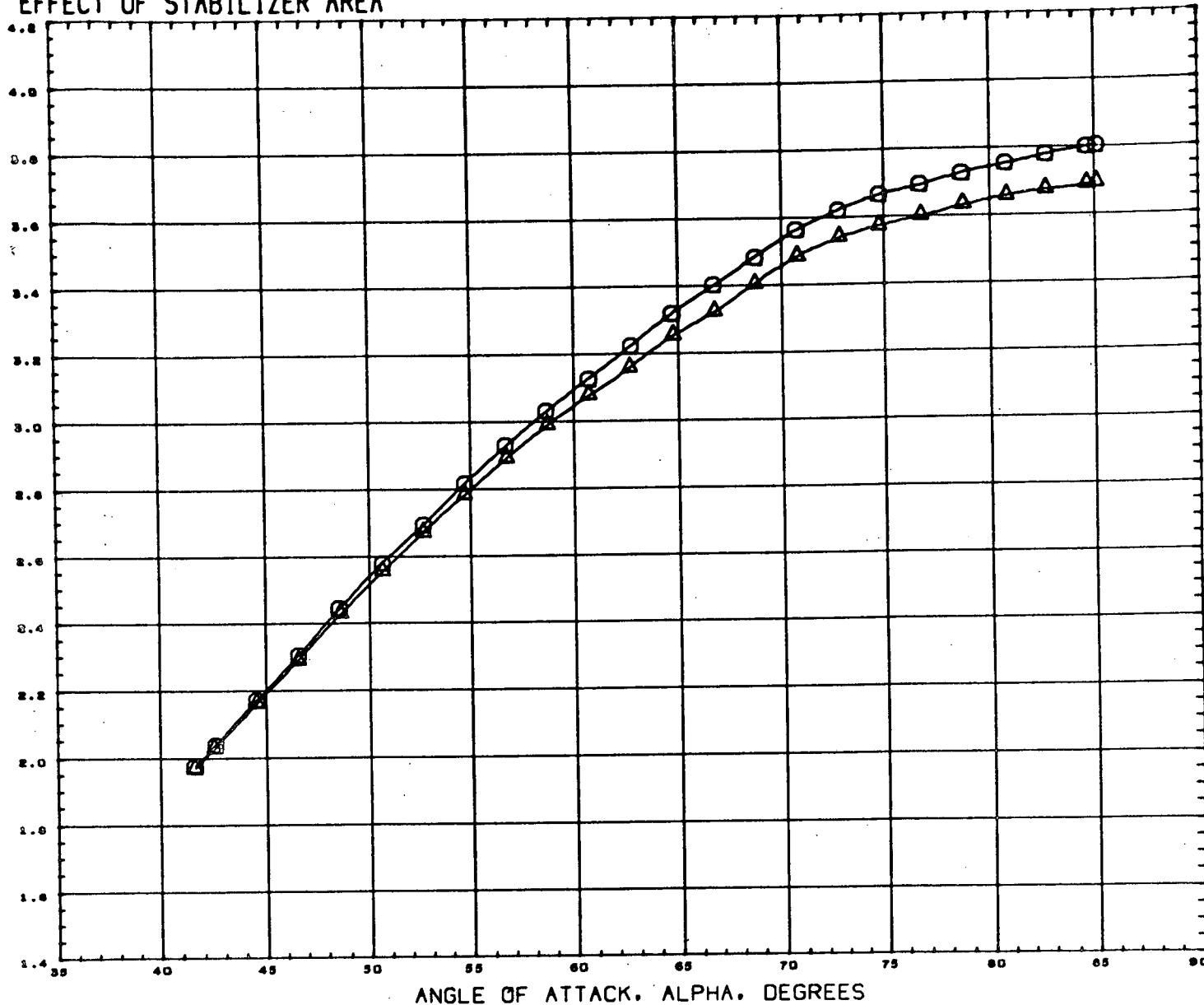
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4346 PERCNT

MACH 8.120

PAGE 44

EFFECT OF STABILIZER AREA

NORMAL FORCE COEFFICIENT, CN



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCX131) GAC HST-020 TBC H-32 BOOSTER B6W5H4
 (RCX311) GAC HST-020 TBC H-32 BOOSTER B6W5H5

BETA HTAIL ELEVTR
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 0.000 -15.000

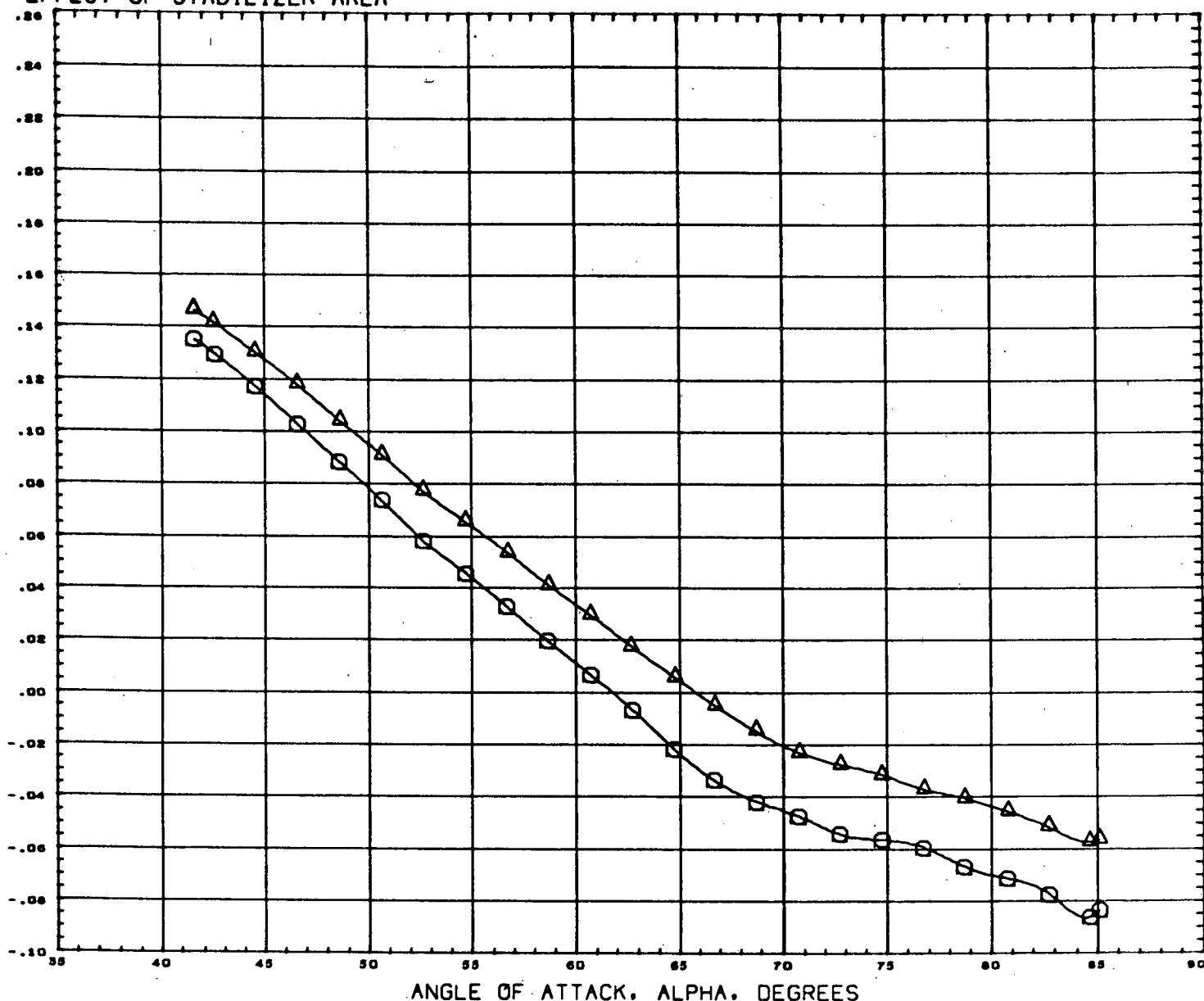
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 BREF 9.6520 INCHES
 XMRP 7.0210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5670 INCHES
 SCALE 0.4340 PERCNT

MACH 6.120

PAGE 45

EFFECT OF STABILIZER AREA

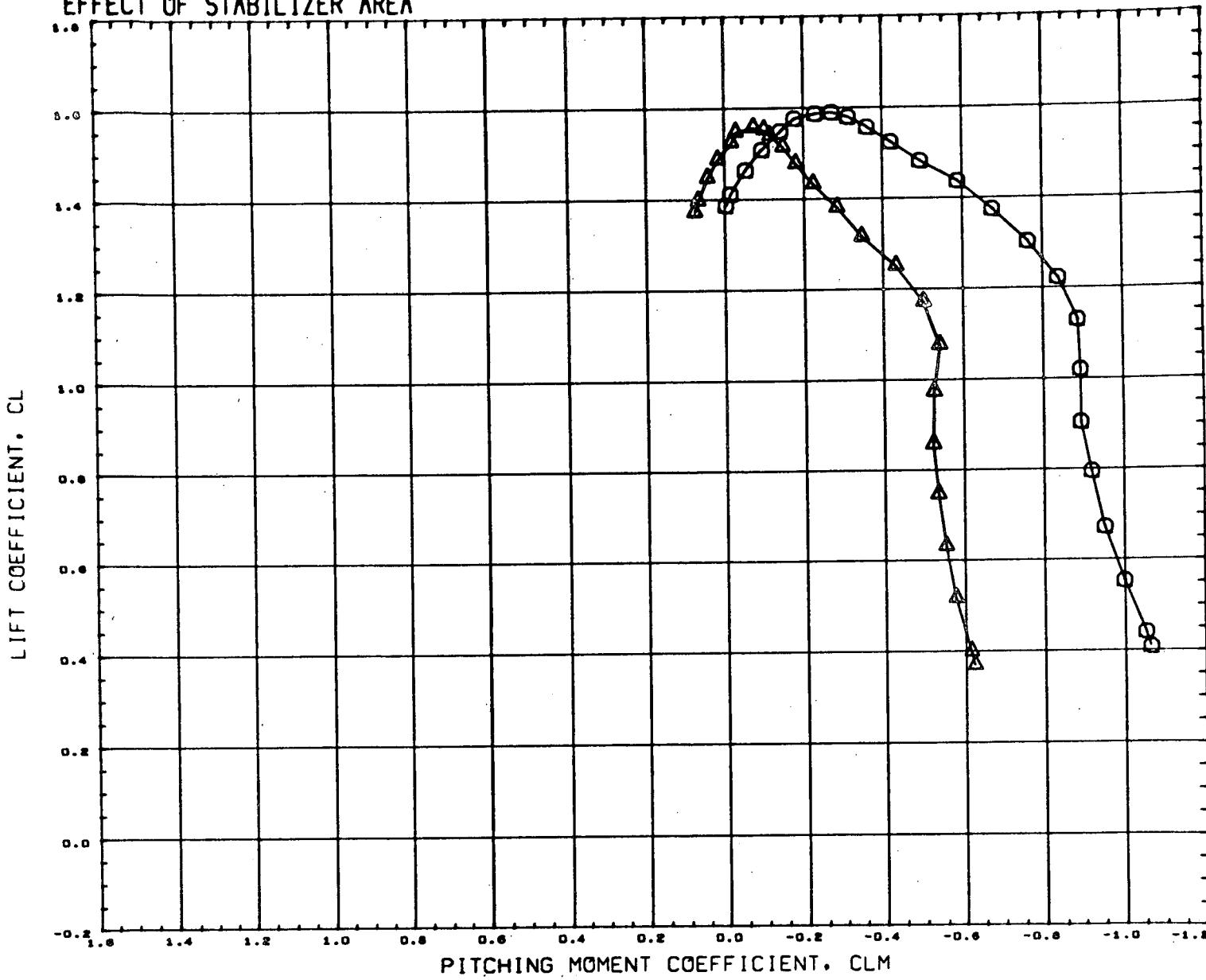
FOREBODY AXIAL FORCE COEFFICIENT. CAF



DATA SET SYMBOL	CONFIGURATION DESCRIPTION			BETA	HTAIL	ELEVTR	REFERENCE INFORMATION	
(RCX131)	GAC HST-020	TBC H-32 BOOSTER	B6W5H4	0.000	-15.000	0.000	SREF	13.3440 INCHES
(RCX311)	GAC HST-020	TBC H-32 BOOSTER	B6W5H5	0.000	-15.000	0.000	LREF	1.4680 INCHES
							BREF	9.6520 INCHES
							XMRP	7.8210 INCHES
							YMRP	0.0000 INCHES
							ZMRP	1.3870 INCHES
							SCALE	0.4348 PERCENT

MACH 8.120

EFFECT OF STABILIZER AREA



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCX131) GAC HST-D2D TBC H-32 BOOSTER B6W5H4
 (RCX311) GAC HST-D2D TBC H-32 BOOSTER B6W5H5

BETA HTAIL ELEVTR
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 0.000 -15.000

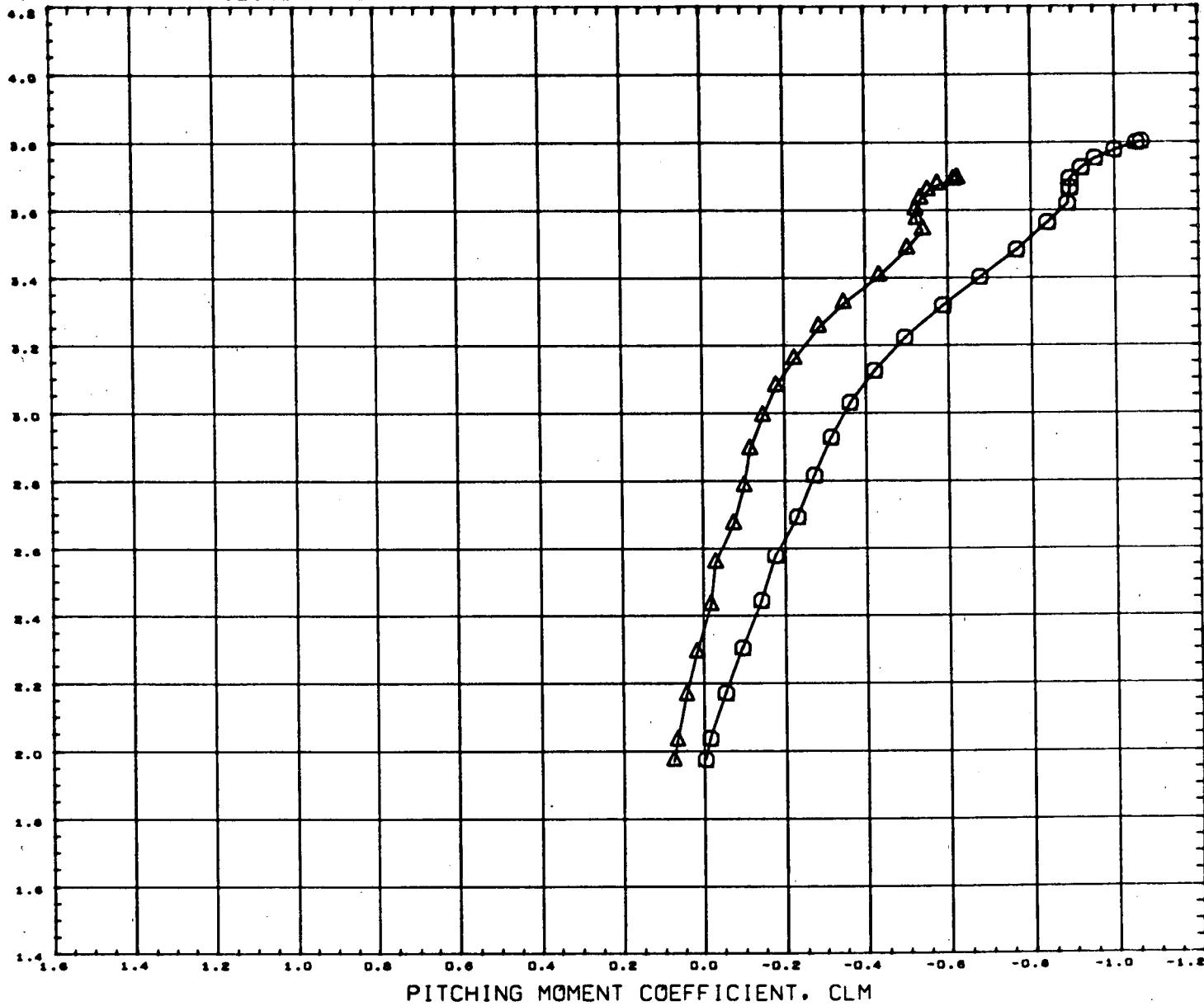
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 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.9870 INCHES
 SCALE 0.4348 PERCENT

MACH 8.120

PAGE 47

EFFECT OF STABILIZER AREA

NORMAL FORCE COEFFICIENT. CN



PITCHING MOMENT COEFFICIENT. CLM

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCX131) GAC HST-020 TBC H-32 BOOSTER B6W5H4
 (RCX311) GAC HST-020 TBC H-32 BOOSTER B6W5H5

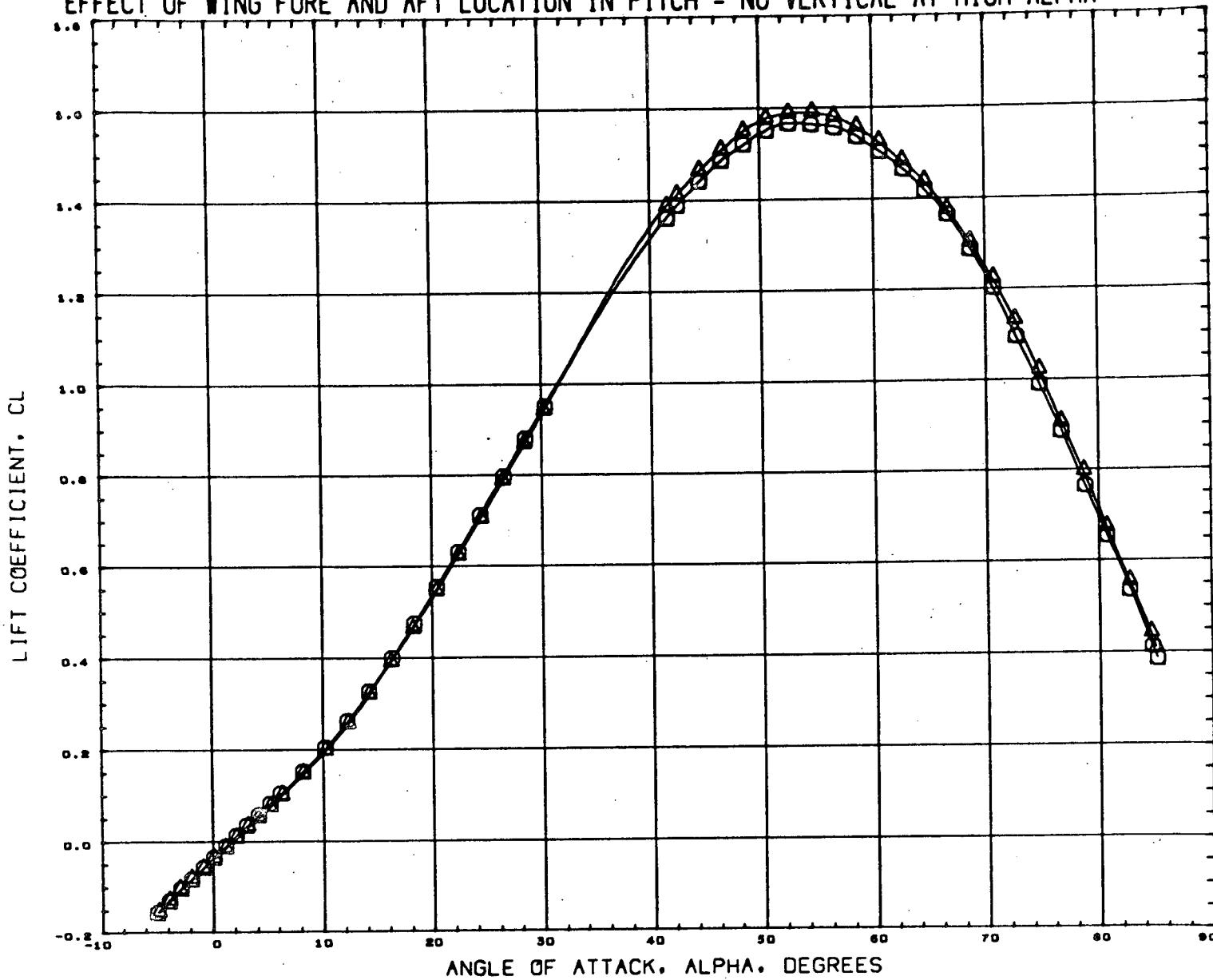
BETA HTAIL ELEVTR
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REFERENCE INFORMATION
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 BREF 9.6520 INCHES
 XMRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCENT

MACH 0.120

PAGE 48

EFFECT OF WING FORE AND AFT LOCATION IN PITCH - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (GCX131) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

BETA HTAIL ELEVTR
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 0.000 -15.000 0.000

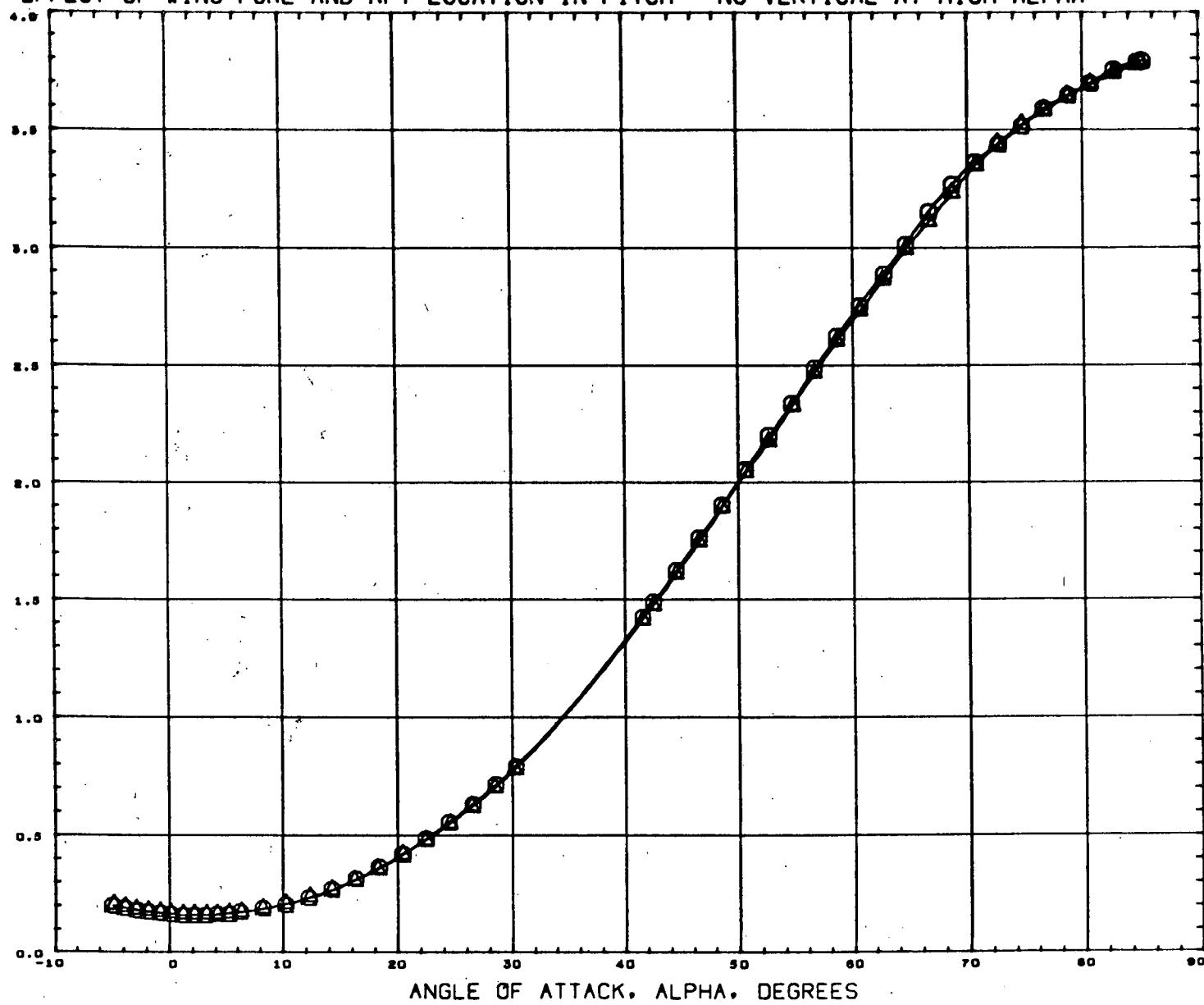
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BREF	9.6520	INCHES
XHLP	7.8210	INCHES
YHLP	0.0000	INCHES
ZHLP	1.9870	INCHES
SCALE	0.4346	PERCENT

MACH 0.120

PAGE 49

EFFECT OF WING FORE AND AFT LOCATION IN PITCH - NO VERTICAL AT HIGH ALPHA

FOREBODY DRAG COEFFICIENT. CDF



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) GAC HST-02D TBC H-32 BOOSTER

(GCX131) GAC HST-02D TBC H-32 BOOSTER

B8W4H4V3 B8W4H4V3

BETA HTAIL ELEVTR
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 0.000 -15.000 0.000

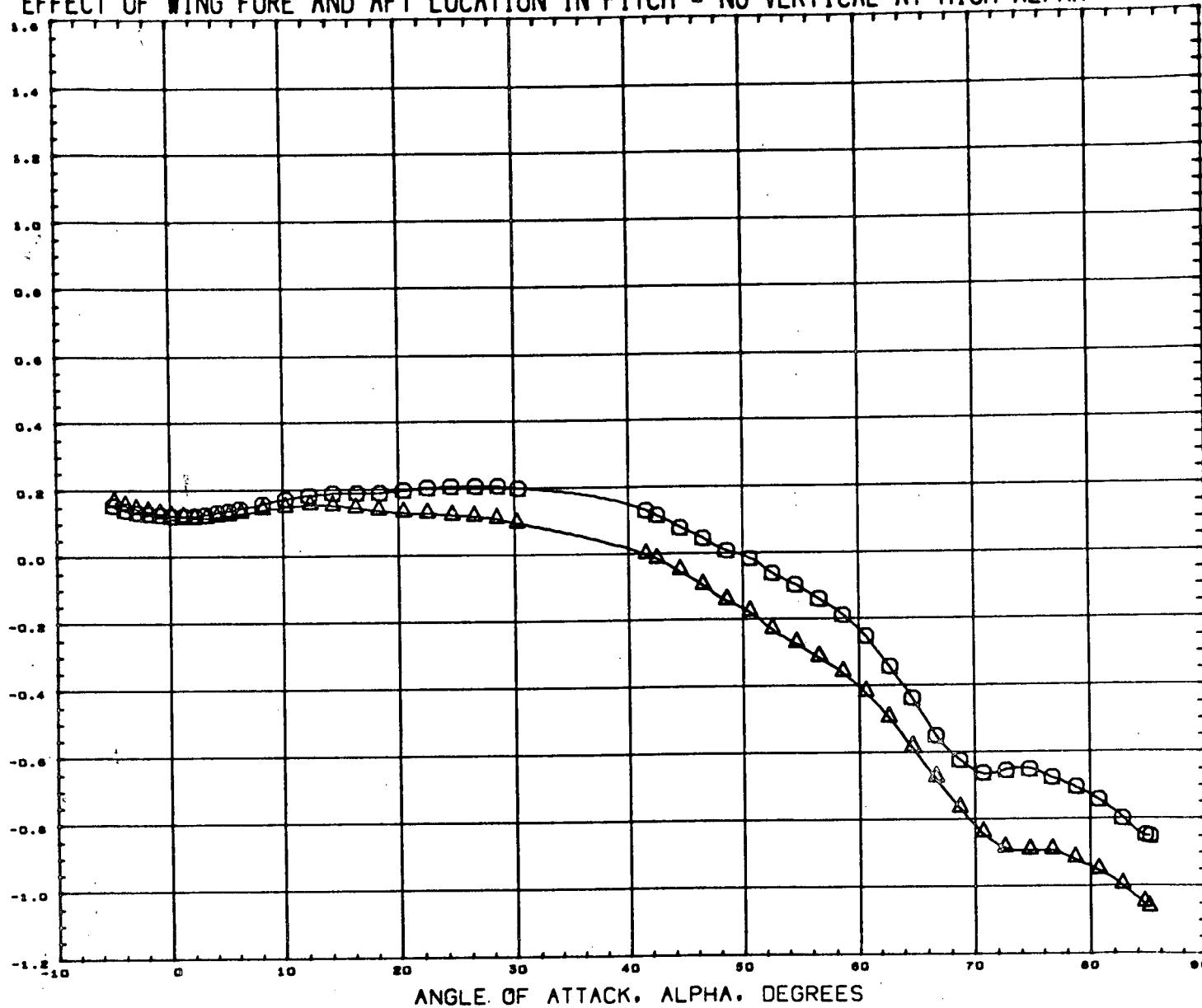
REFERENCE INFORMATION
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 LREF 1.4680 INCHES
 BREF 9.6520 INCHES
 XMRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.3670 INCHES
 SCALE 0.4348 PERCENT

MACH 8.120

PAGE 50

EFFECT OF WING FORE AND AFT LOCATION IN PITCH - NO VERTICAL AT HIGH ALPHA

PITCHING MOMENT COEFFICIENT, CLM



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(GCX081) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

(GCX131) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

BETA HTAIL ELEVTR

0.000 -15.000 0.000

0.000 -15.000 0.000

REFERENCE INFORMATION

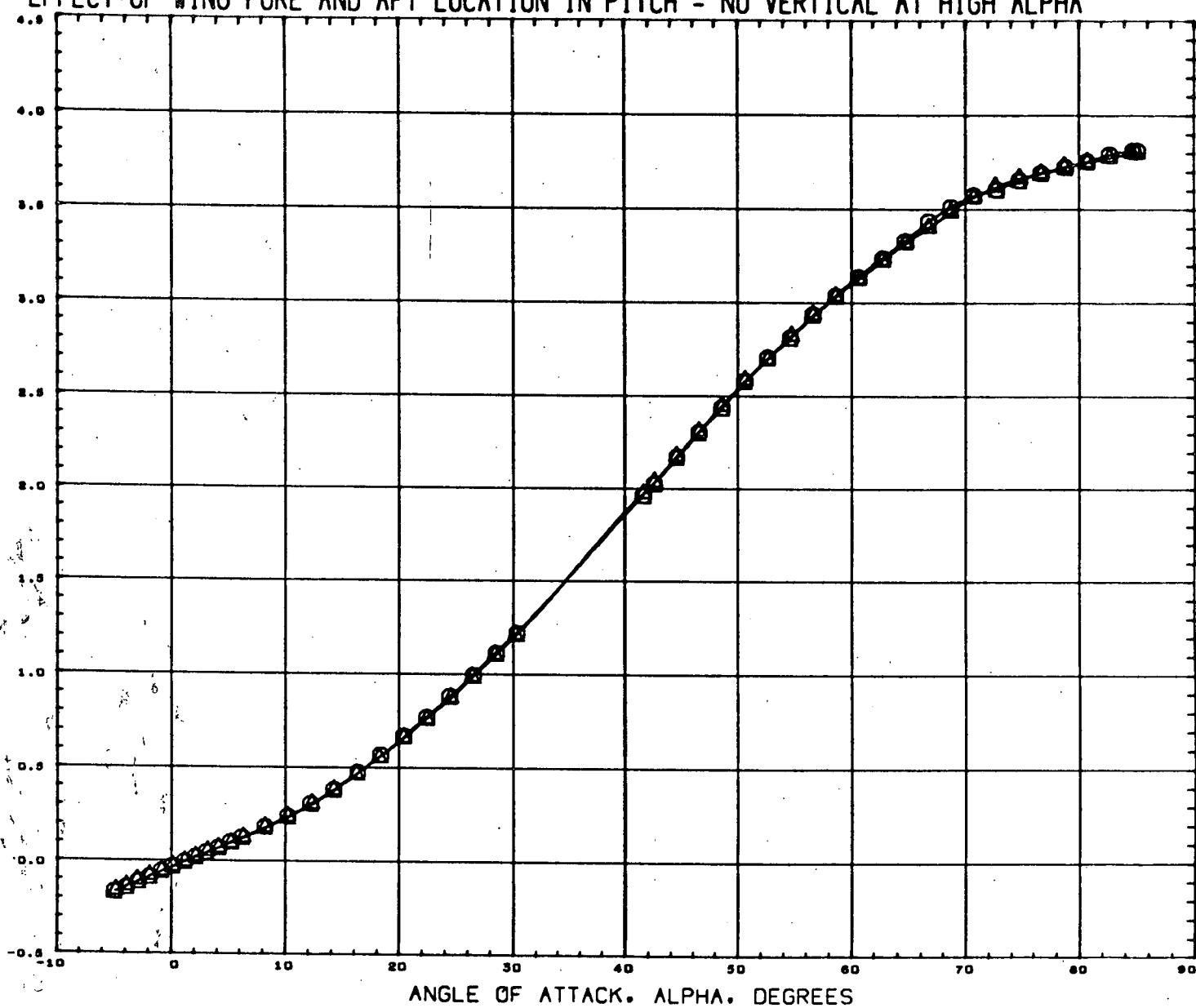
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LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.3870	INCHES
SCALE	0.4348	PERCNT

MACH 8.120

PAGE 51

EFFECT OF WING FORE AND AFT LOCATION IN PITCH - NO VERTICAL AT HIGH ALPHA

NORMAL FORCE COEFFICIENT, CN



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) GAC HST-02D TBC H-32 BOOSTER B8W4H4V3
 (GCX131) GAC HST-02D TBC H-32 BOOSTER B8W4H4V3

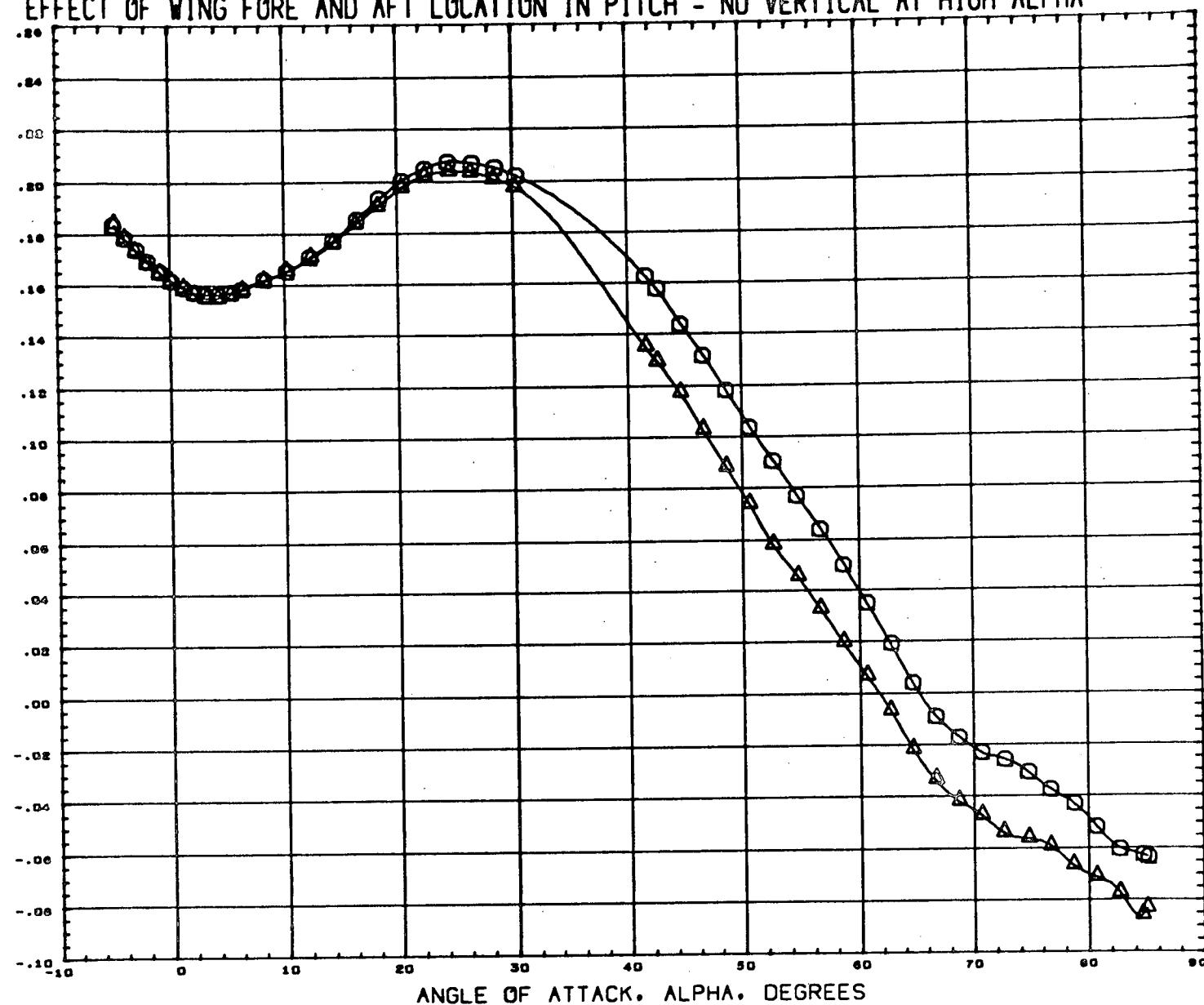
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 0.000 -15.000 0.000

REFERENCE INFORMATION
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 BREF 9.6520 INCHES
 XMRP 7.0210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4340 PERCENT

MACH 8.120

EFFECT OF WING FORE AND AFT LOCATION IN PITCH - NO VERTICAL AT HIGH ALPHA

FOREBODY AXIAL FORCE COEFFICIENT. CAF



ANGLE OF ATTACK. ALPHA. DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) Q GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (GCX131) Q GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

BETA HTAIL ELEVTR
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 0.000 -15.000 0.000

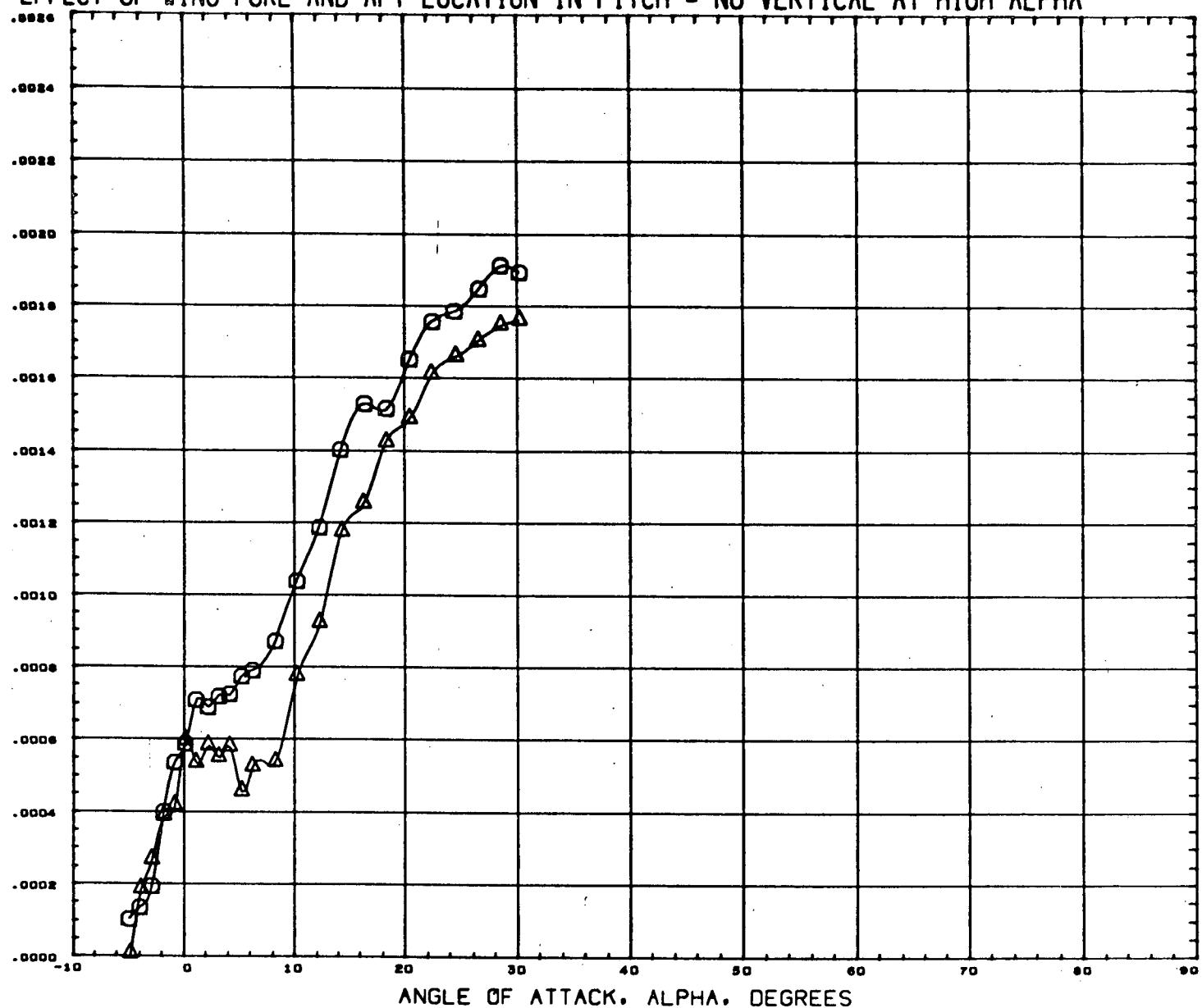
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.9870 INCHES
 SCALE 0.4348 PERCENT

MACH 0.120

PAGE 53

EFFECT OF WING FORE AND AFT LOCATION IN PITCH - NO VERTICAL AT HIGH ALPHA

BASE DRAG COEFFICIENT, CDB



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX222) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX342) GAC HST-020 TBC H-32 BOOSTER B8W5H4V3

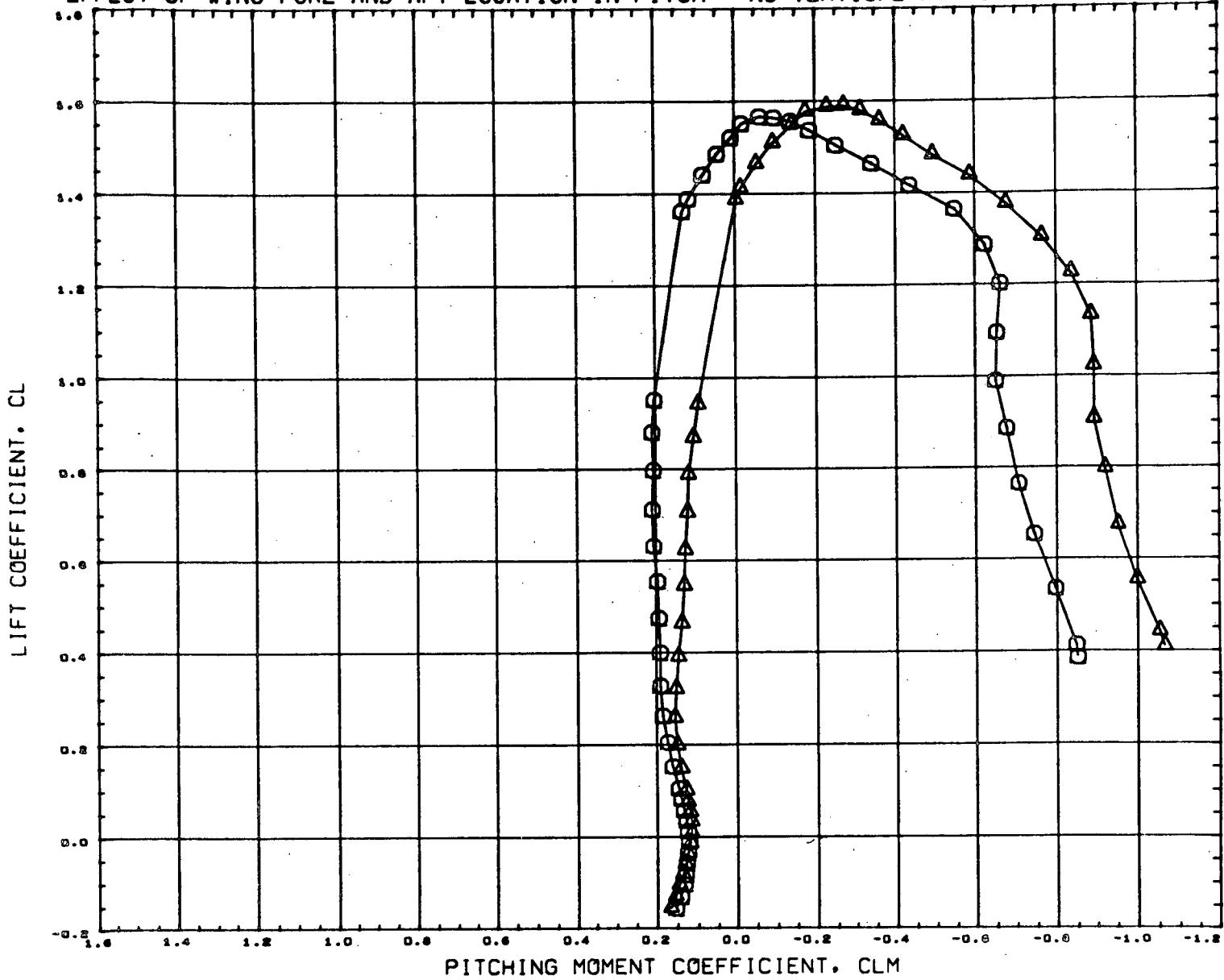
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 BREF 9.6520 INCHES
 XMRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.3870 INCHES
 SCALE 0.4348 PERCNT

MACH 0.120

PAGE 54

EFFECT OF WING FORE AND AFT LOCATION IN PITCH - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (GCX131) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

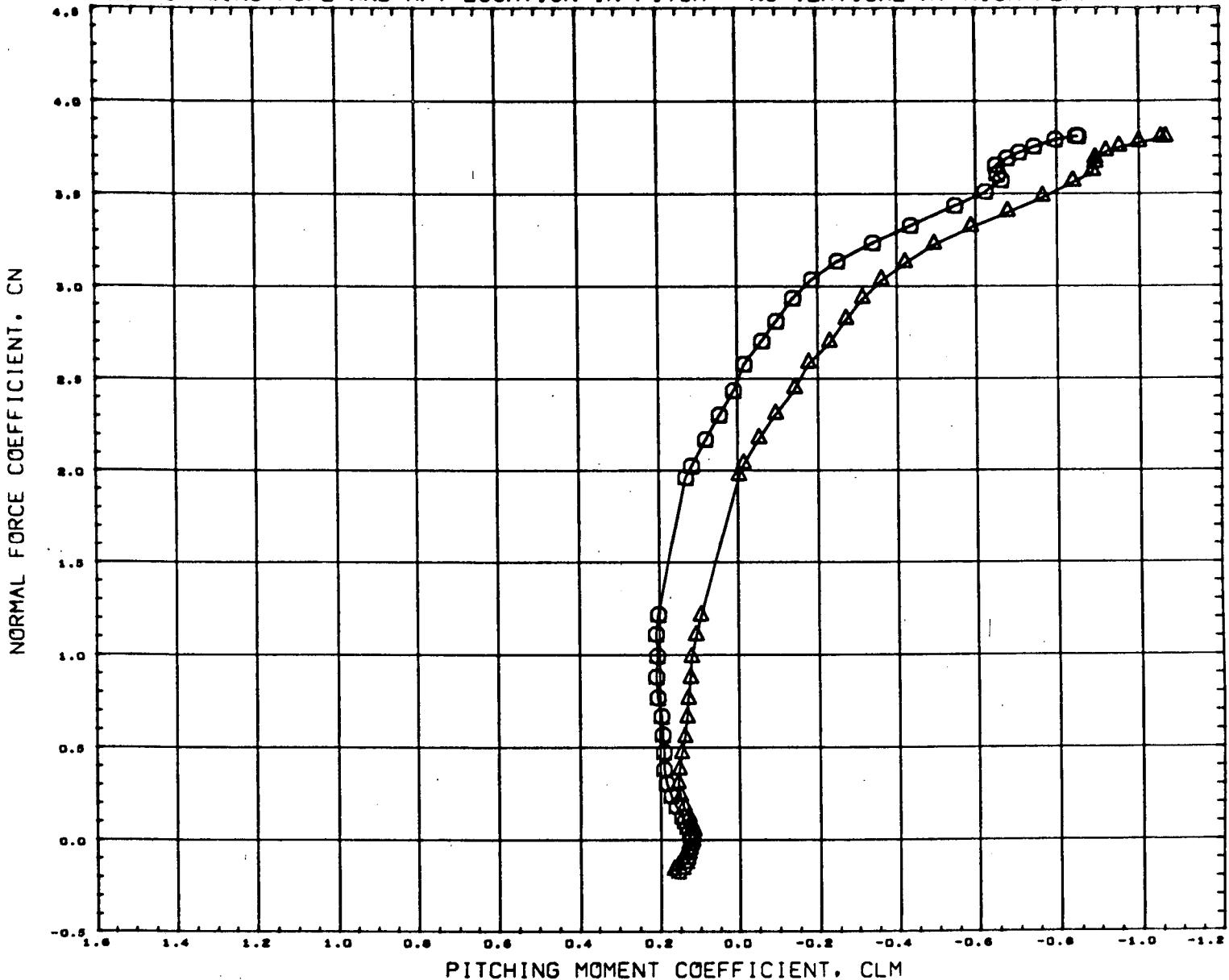
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BREF	9.6520	INCHES
XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.3870	INCHES
SCALE	0.4346	PERCENT

MACH 0.120

PAGE 55

EFFECT OF WING FORE AND AFT LOCATION IN PITCH - NO VERTICAL AT HIGH ALPHA



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX01) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (GCX13) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

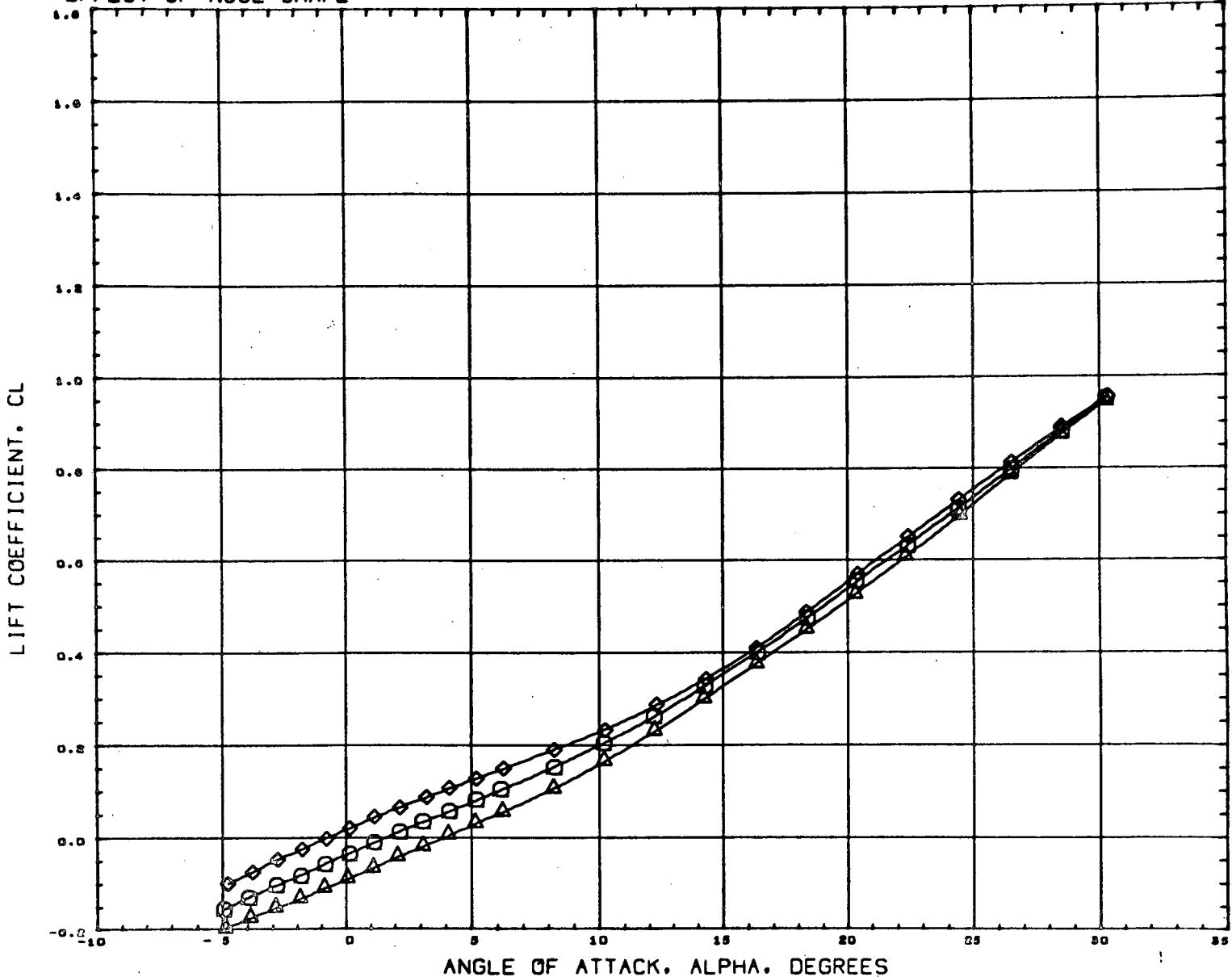
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BREF 9.6920 INCHES
XMRP 7.6210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4340 PERCNT

MACH 8.120

PAGE 56

EFFECT OF NOSE SHAPE



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX222) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX352) GAC HST-020 TBC H-32 BOOSTER B12W4H4V3
 (FCX362) GAC HST-020 TBC H-32 BOOSTER B11W4H4V3

BETA HTAIL ELEVTR

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0.000	-15.000	0.000

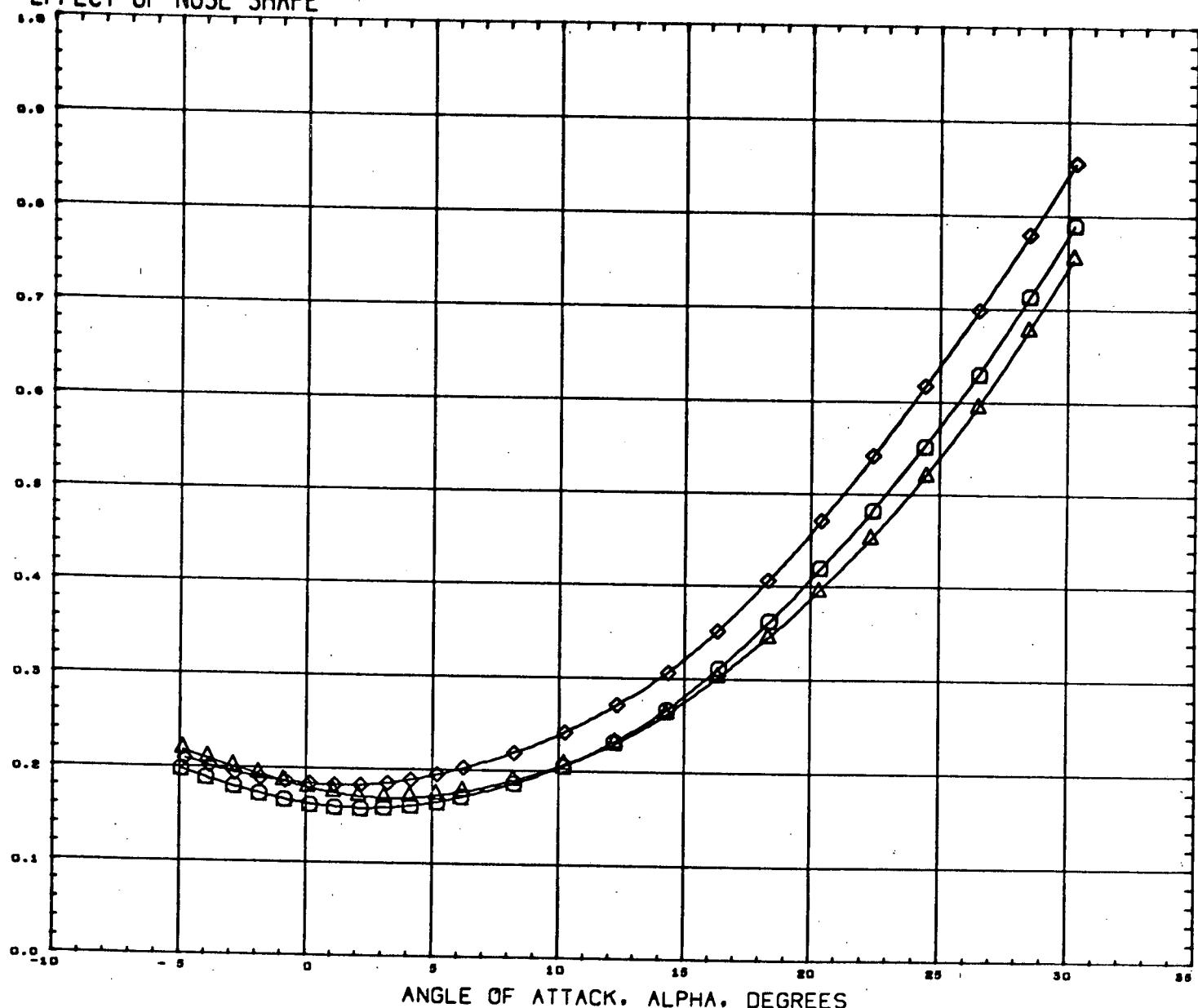
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YMRP	0.0000	INCHES
ZMRP	1.5670	INCHES
SCALE	0.4346	PERCENT

MACH 0.120

EFFECT OF NOSE SHAPE

FOREBODY DRAG COEFFICIENT, COF



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX222) GAC HST-D2D TBC H-32 BOOSTER
(FCX322) GAC HST-D2D TBC H-32 BOOSTER
(FCX362) GAC HST-D2D TBC H-32 BOOSTER

B6W4H4V3
B12W4H4V3
B11W4H4V3

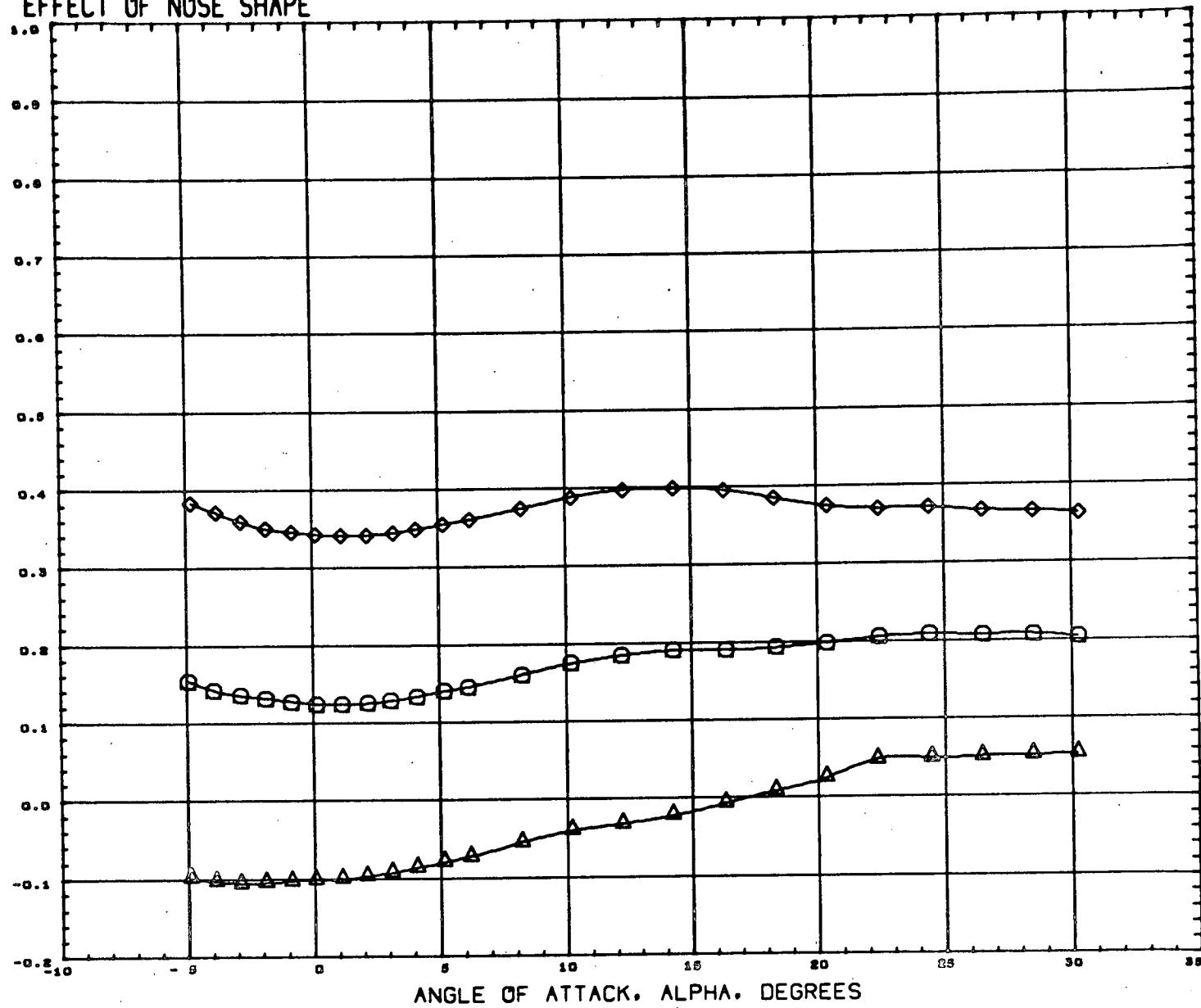
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REFERENCE INFORMATION
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LREF 1.4660 INCHES
BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCNT

MACH 6.120

EFFECT OF NOSE SHAPE

PITCHING MOMENT COEFFICIENT. CLM



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX222) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX352) GAC HST-020 TBC H-32 BOOSTER B12W4H4V3
 (FCX362) GAC HST-020 TBC H-32 BOOSTER B11W4H4V3

BETA HTAIL ELEVTR

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0.000	-15.000	0.000
0.000	-15.000	0.000

REFERENCE INFORMATION

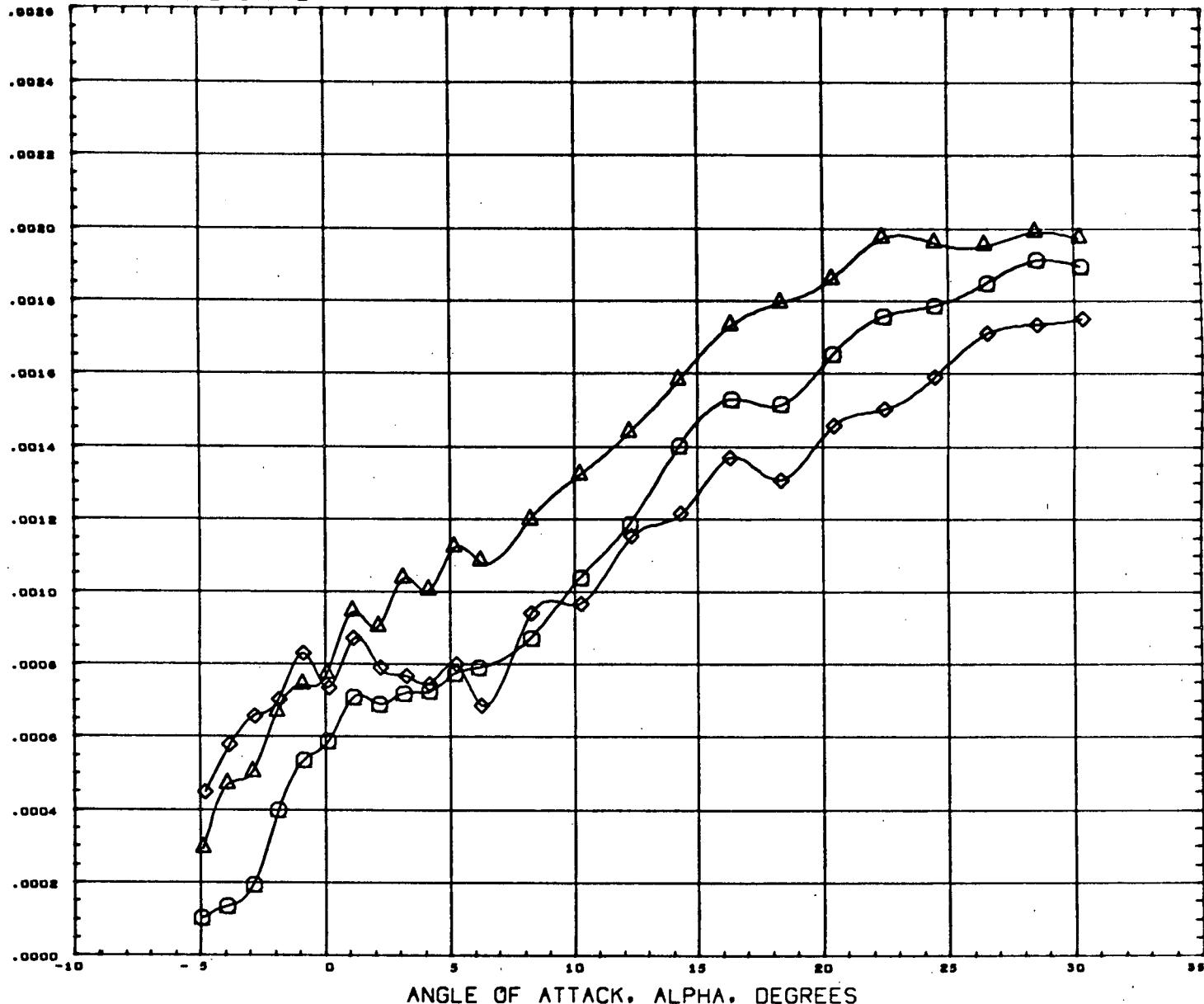
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BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.9870	INCHES
SCALE	0.4348	PERCNT

MACH 6.120

PAGE 59

EFFECT OF NOSE SHAPE

BASE DRAG COEFFICIENT. CDB



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION

DATA SET SYMBOL	CONFIGURATION	DESCRIPTION	BETA	HTAIL	ELEVTR	
(FCX222)	○	GAC HST-020 TBC H-32 BOOSTER	B8W4H4V3	0.000	-15.000	0.000
(FCX352)	△	GAC HST-020 TBC H-32 BOOSTER	B12W4H4V3	0.000	-15.000	0.000
(FCX362)	◇	GAC HST-020 TBC H-32 BOOSTER	B11W4H4V3	0.000	-15.000	0.000

BETA HTAIL ELEVTR

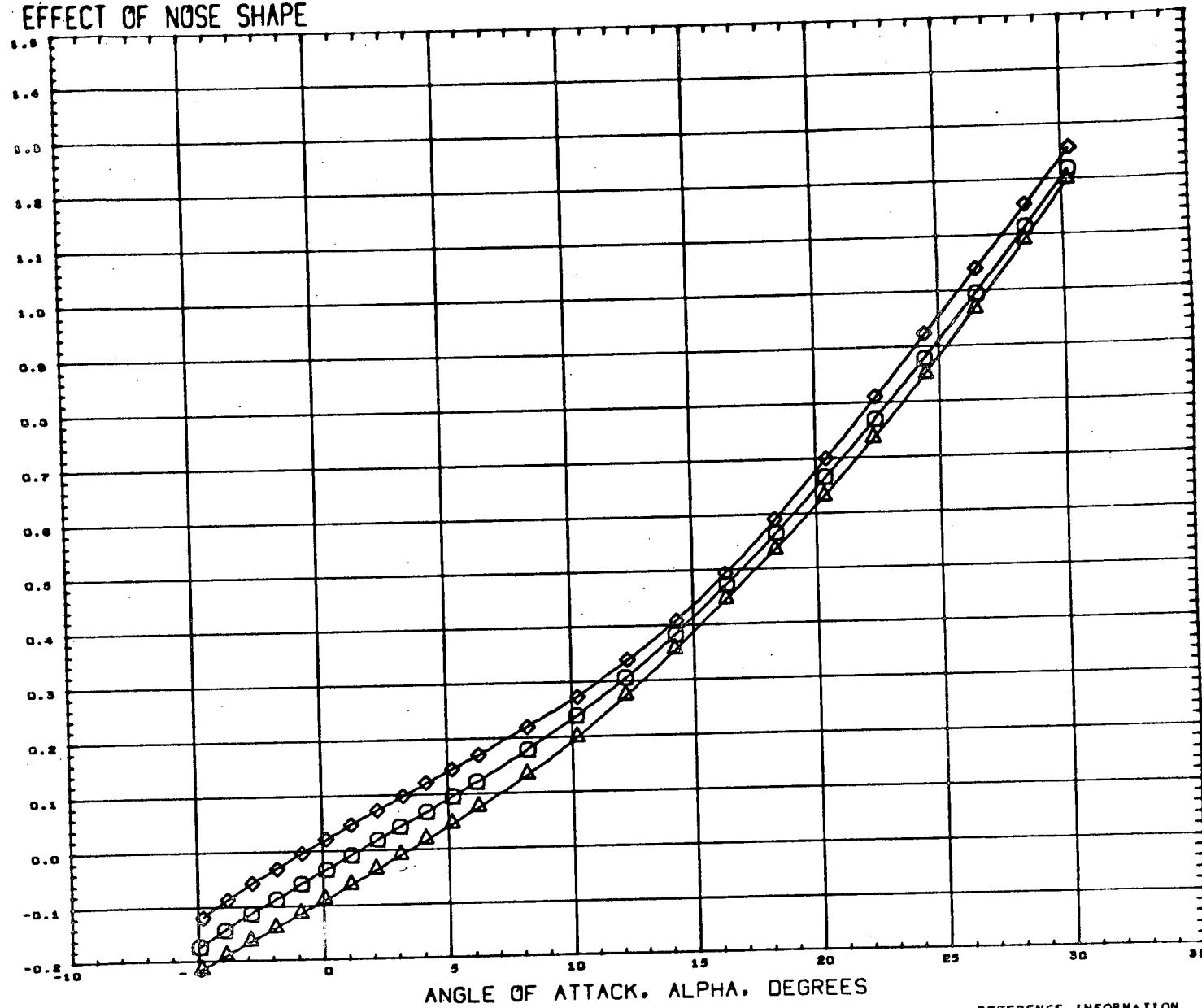
REFERENCE INFORMATION
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BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.9870 INCHES
SCALE 0.4348 PERCNT

MACH 8.120

PAGE 60

EFFECT OF NOSE SHAPE

NORMAL FORCE COEFFICIENT, CN



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX222) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX352) GAC HST-020 TBC H-32 BOOSTER B12W4H4V3
 (FCX362) GAC HST-020 TBC H-32 BOOSTER B11W4H4V3

BETA HTAIL ELEVTR

0.000	-15.000	0.000
0.000	-15.000	0.000
0.000	-15.000	0.000

REFERENCE INFORMATION

SREF	13.3440	INCHES
LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5670	INCHES
SCALE	0.4348	PERCNT

MACH 6.120

PAGE 61

EFFECT OF NOSE SHAPE

FOREBODY AXIAL FORCE COEFFICIENT, CAF



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX222) GAC HST-D20 TBC H-32 BOOSTER B8W4H4V3
 (FCX352) GAC HST-D20 TBC H-32 BOOSTER B12W4H4V3
 (FCX362) GAC HST-D20 TBC H-32 BOOSTER B11W4H4V3

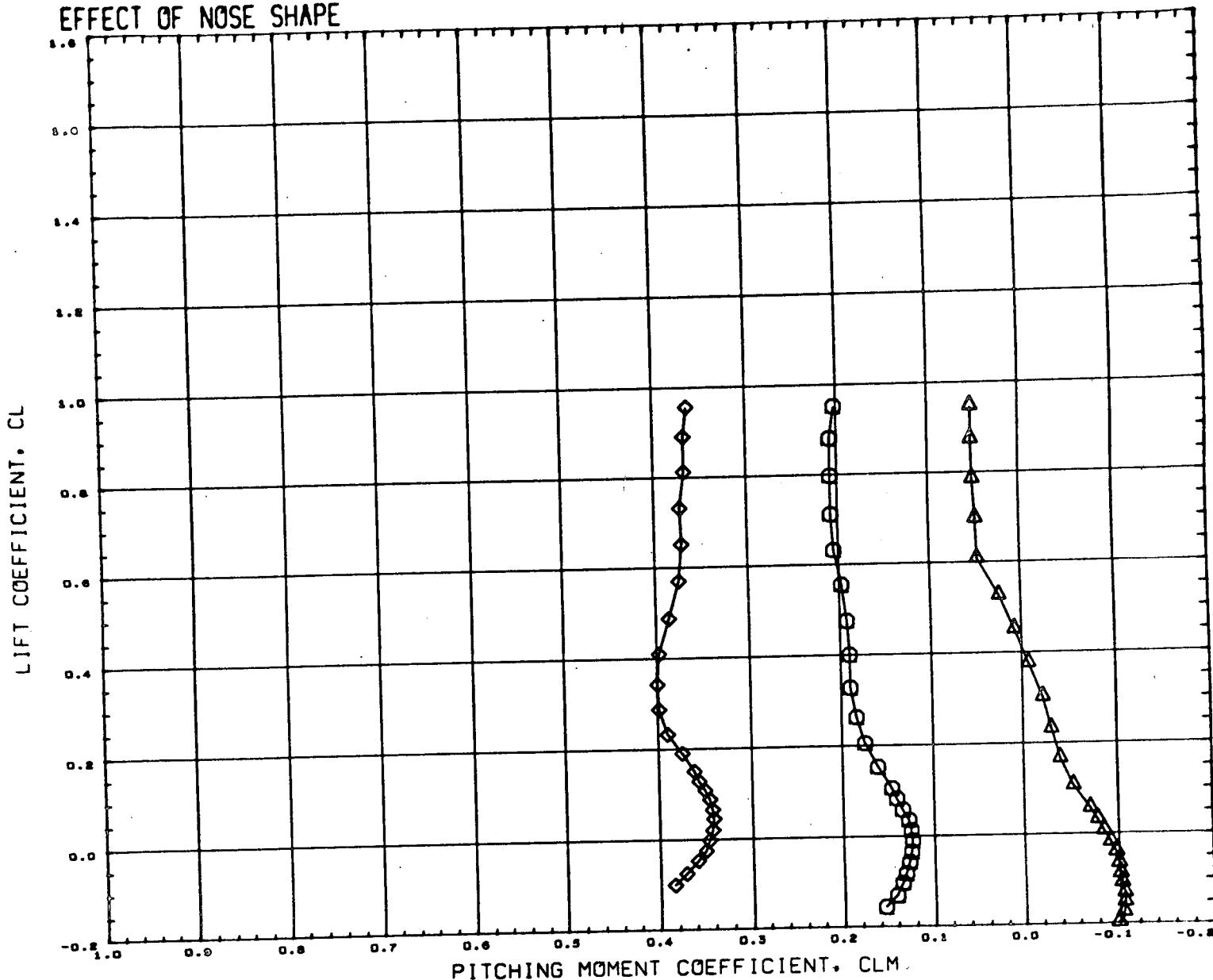
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 0.000 -15.000 0.000

REFERENCE INFORMATION
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 BREF 9.6520 INCHES
 XMRF 7.6210 INCHES
 YMRF 0.0000 INCHES
 ZMRF 1.5870 INCHES
 SCALE 0.4346 PERCNT

MACH 6.120

PAGE 62

EFFECT OF NOSE SHAPE



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	B8W4H4V3	B12W4H4V3	B11W4H4V3
(FCX222)	GAC HST-020 TBC H-32 BOOSTER			
(FCX352)	GAC HST-020 TBC H-32 BOOSTER			
(FCX362)	GAC HST-020 TBC H-32 BOOSTER			

BETA	HTAIL	ELEVTR
0.000	-15.000	0.000
0.000	-15.000	0.000
0.000	-15.000	0.000

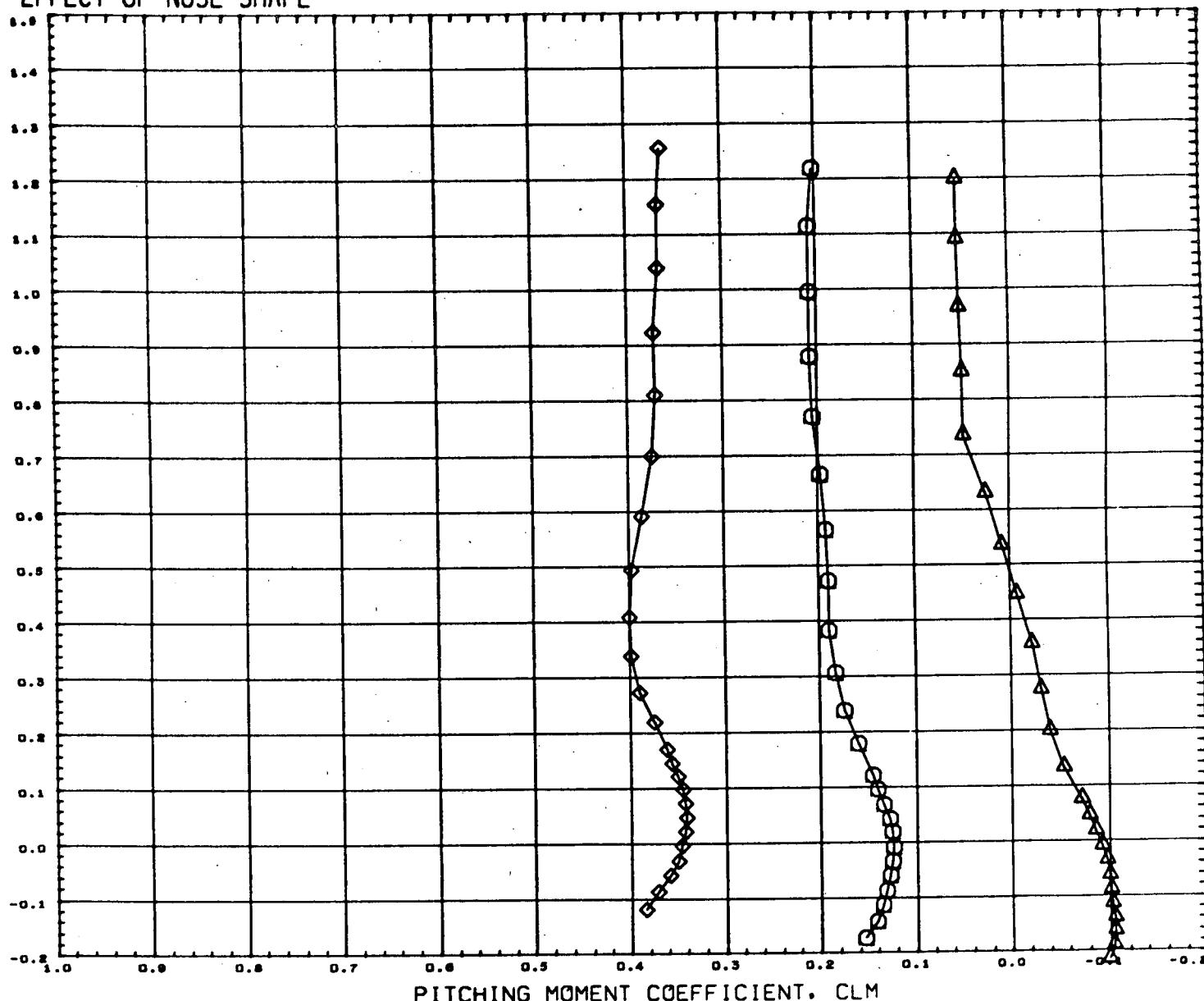
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BREF 9.0520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5670 INCHES
SCALE 0.4348 PERCNT

MACH 0.120

PAGE 63

EFFECT OF NOSE SHAPE

NORMAL FORCE COEFFICIENT, CN



PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	B8W4H4V3	B12W4H4V3	B11W4H4V3
(FCX222)	GAC HST-020 TBC H-32 BOOSTER	0.000	-15.000	0.000
(FCX352)	GAC HST-020 TBC H-32 BOOSTER	0.000	-15.000	0.000
(FCX362)	GAC HST-020 TBC H-32 BOOSTER	0.000	-15.000	0.000

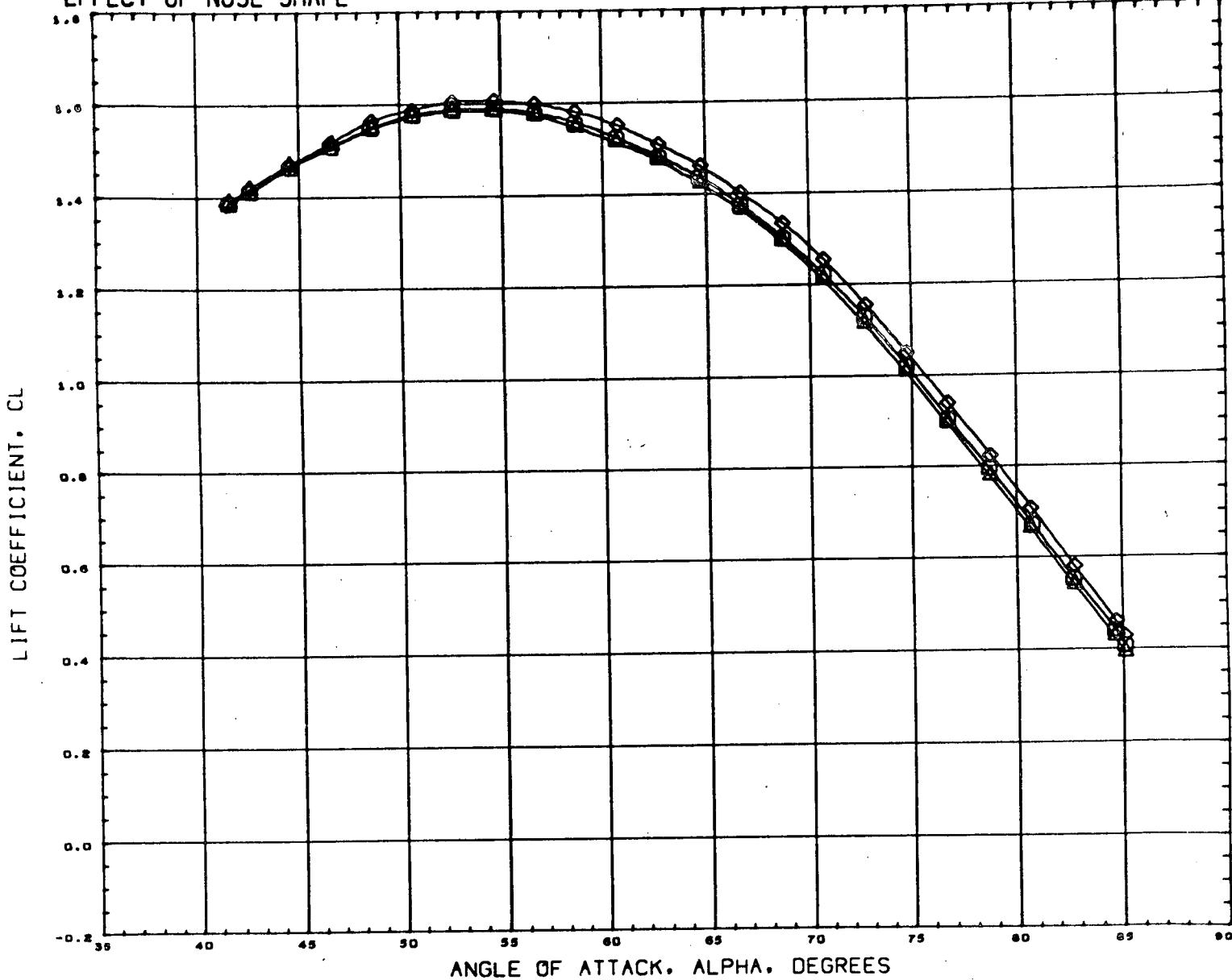
BETA	HTAIL	ELEVTR
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0.000	-15.000	0.000
0.000	-15.000	0.000

REFERENCE INFORMATION
SREF 13.3440 SQ.IN.
LREF 1.4680 INCHES
BREF 9.6920 INCHES
XMRP 7.0210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCNT

MACH 6.120

PAGE 64

EFFECT OF NOSE SHAPE



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RCX131) GAC HST-020 TBC H-32 BOOSTER B6W5H4
 (RCX321) GAC HST-020 TBC H-32 BOOSTER B5W5H4
 (RCX301) GAC HST-020 TBC H-32 BOOSTER B9W5H4

BETA HTAIL ELEVTR

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 0.000 -15.000 0.000
 0.000 -15.000 0.000

REFERENCE INFORMATION

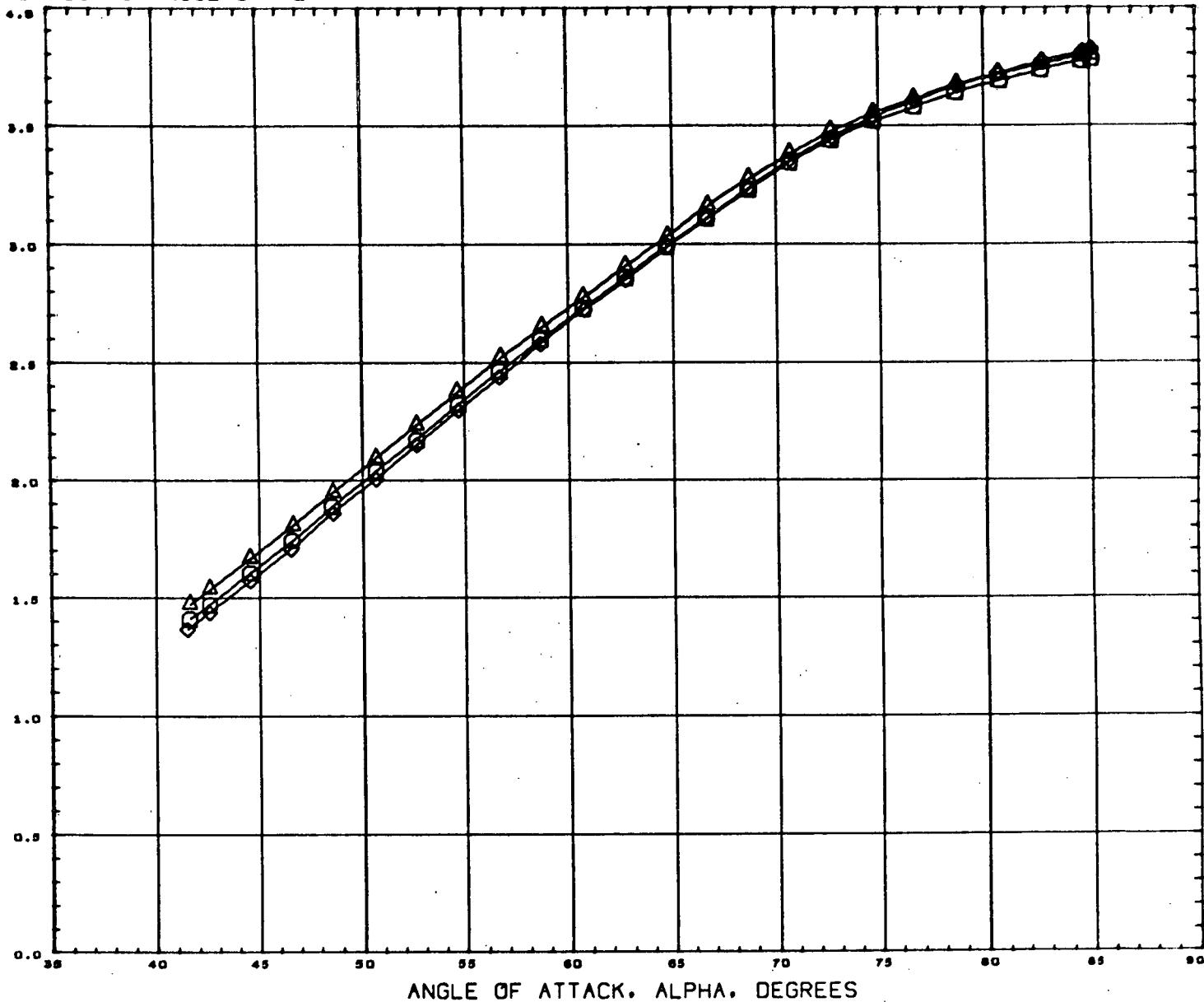
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 BREF 9.6520 INCHES
 XMRF 7.8210 INCHES
 YMRF 0.0000 INCHES
 ZMRF 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

PAGE 65

EFFECT OF NOSE SHAPE

FOREBODY DRAG COEFFICIENT, CDF



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RCX131) O GAC MST-020 TBC H-32 BOOSTER B6W5H4
 (RCX321) □ GAC MST-020 TBC H-32 BOOSTER B5W5H4
 (RCX301) ◇ GAC MST-020 TBC H-32 BOOSTER B9W5H4

BETA MTAIL ELEVTR

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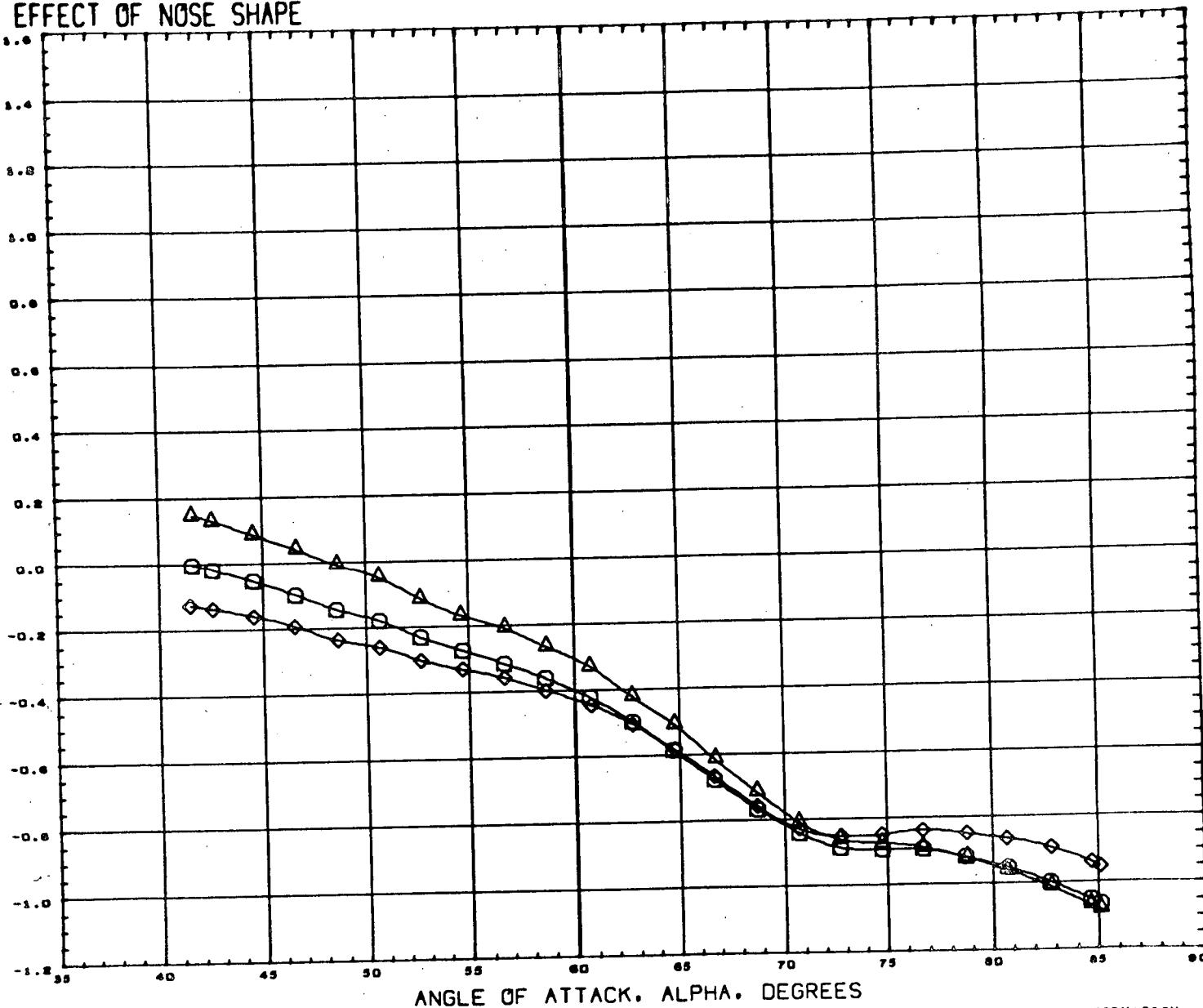
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YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4348	PERCENT

MACH 6.120

PAGE 66

EFFECT OF NOSE SHAPE

PITCHING MOMENT COEFFICIENT. CLM



ANGLE OF ATTACK. ALPHA. DEGREES

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(RCX131)	□	GAC HST-020 TBC H-32 BOOSTER 96W5H4
(RCX321)	○	GAC HST-020 TBC H-32 BOOSTER 85W5H4
(RCX301)	◇	GAC HST-020 TBC H-32 BOOSTER 89W5H4

BETA	HTAIL	ELEVTR
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0.000	-15.000	0.000
0.000	-15.000	0.000

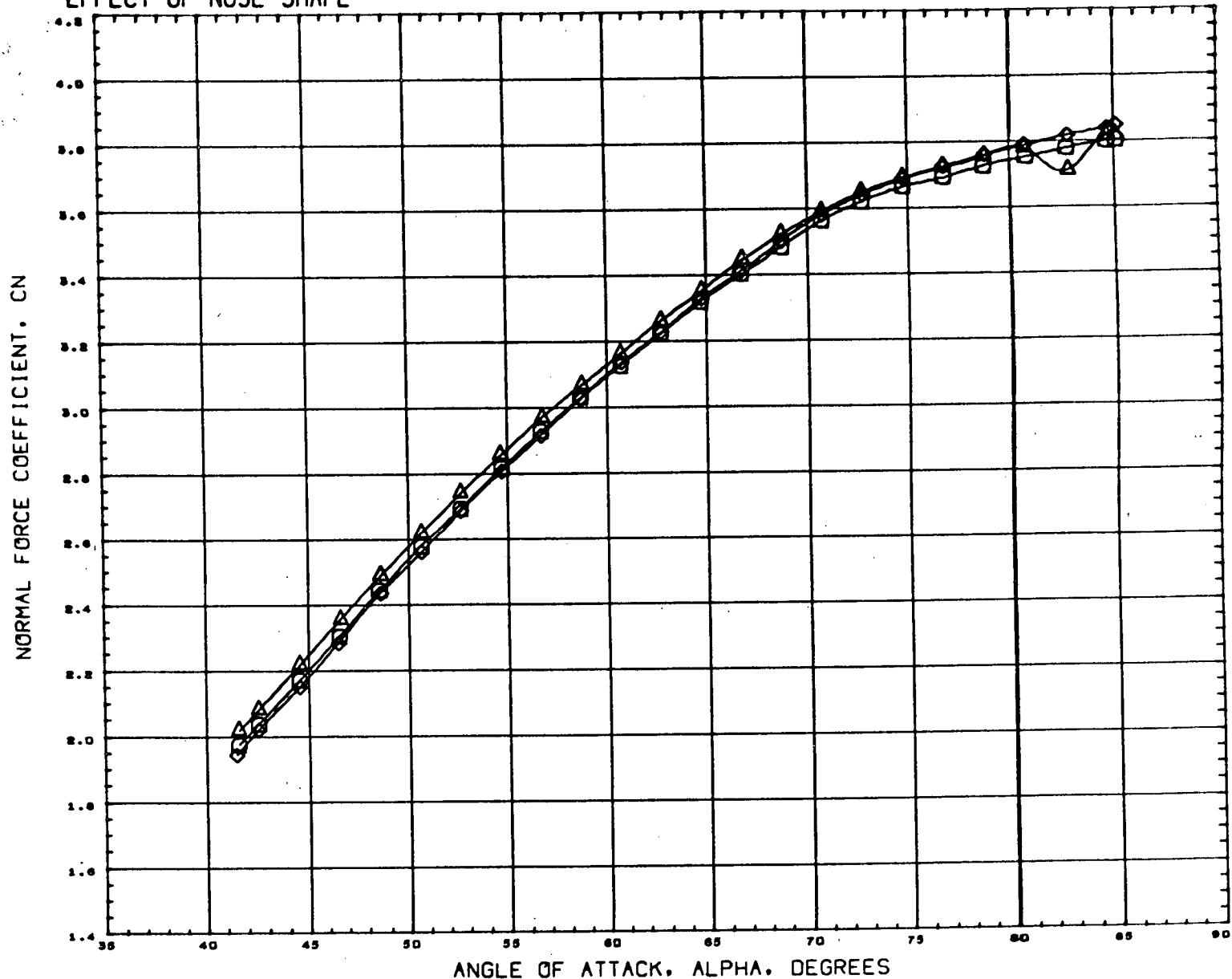
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BREF	9.6520	INCHES
XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.9870	INCHES
SCALE	0.4348	PERCENT

MACH

8.120

PAGE 67

EFFECT OF NOSE SHAPE



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCX131) GAC HST-02D TBC H-32 BOOSTER B6W5H4
 (RCX321) GAC HST-02D TBC H-32 BOOSTER B5W5H4
 (RCX301) GAC HST-02D TBC H-32 BOOSTER B9W5H4

BETA HTAIL ELEVTR
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 0.000 -15.000 0.000
 0.000 -15.000 0.000

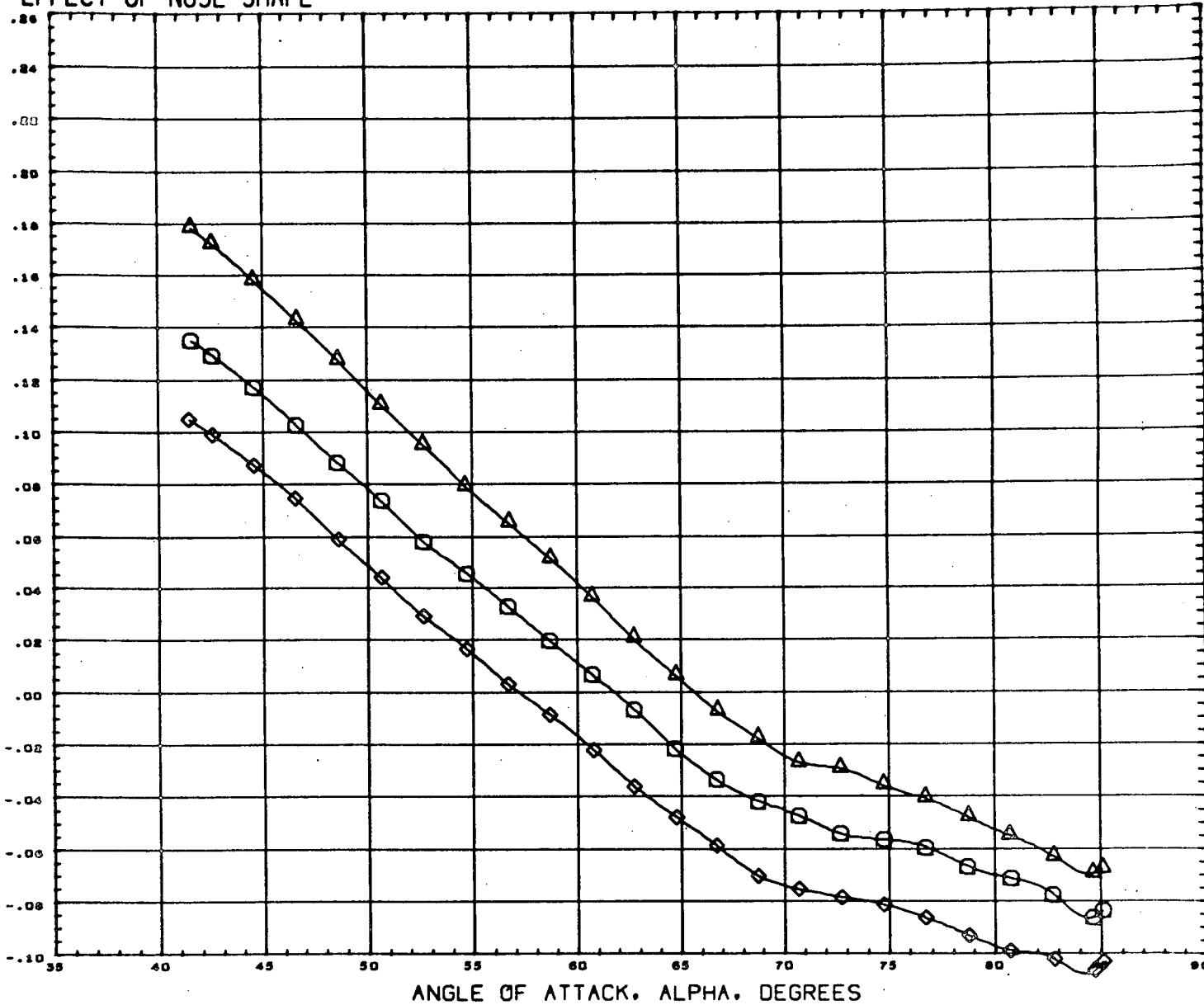
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 ZMRP 1.5670 INCHES
 SCALE 0.4346 PERCNT

MACH 8.120

PAGE 68

EFFECT OF NOSE SHAPE

FOREBODY AXIAL FORCE COEFFICIENT, C_AF



ANGLE OF ATTACK, ALPHA, DEGREES

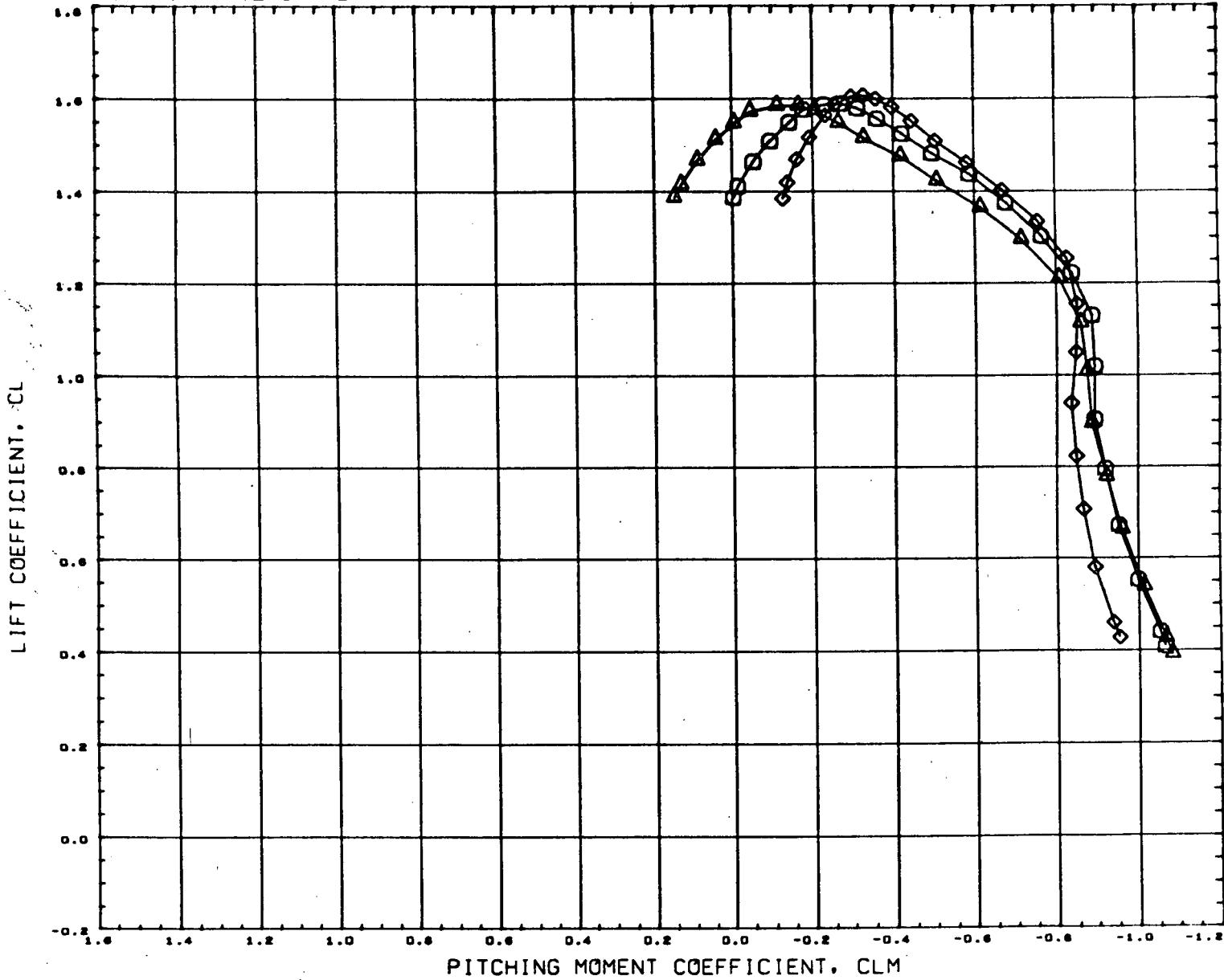
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 (RCX321) GAC HST-020 TBC H-32 BOOSTER 85W5H4
 (RCX301) GAC HST-020 TBC H-32 BOOSTER 89W5H4

BETA HTAIL ELEVTR
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 0.000 -15.000 0.000

REFERENCE INFORMATION
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 LREF 1.4680 INCHES
 BREF 9.6520 INCHES
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 ZHRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

EFFECT OF NOSE SHAPE



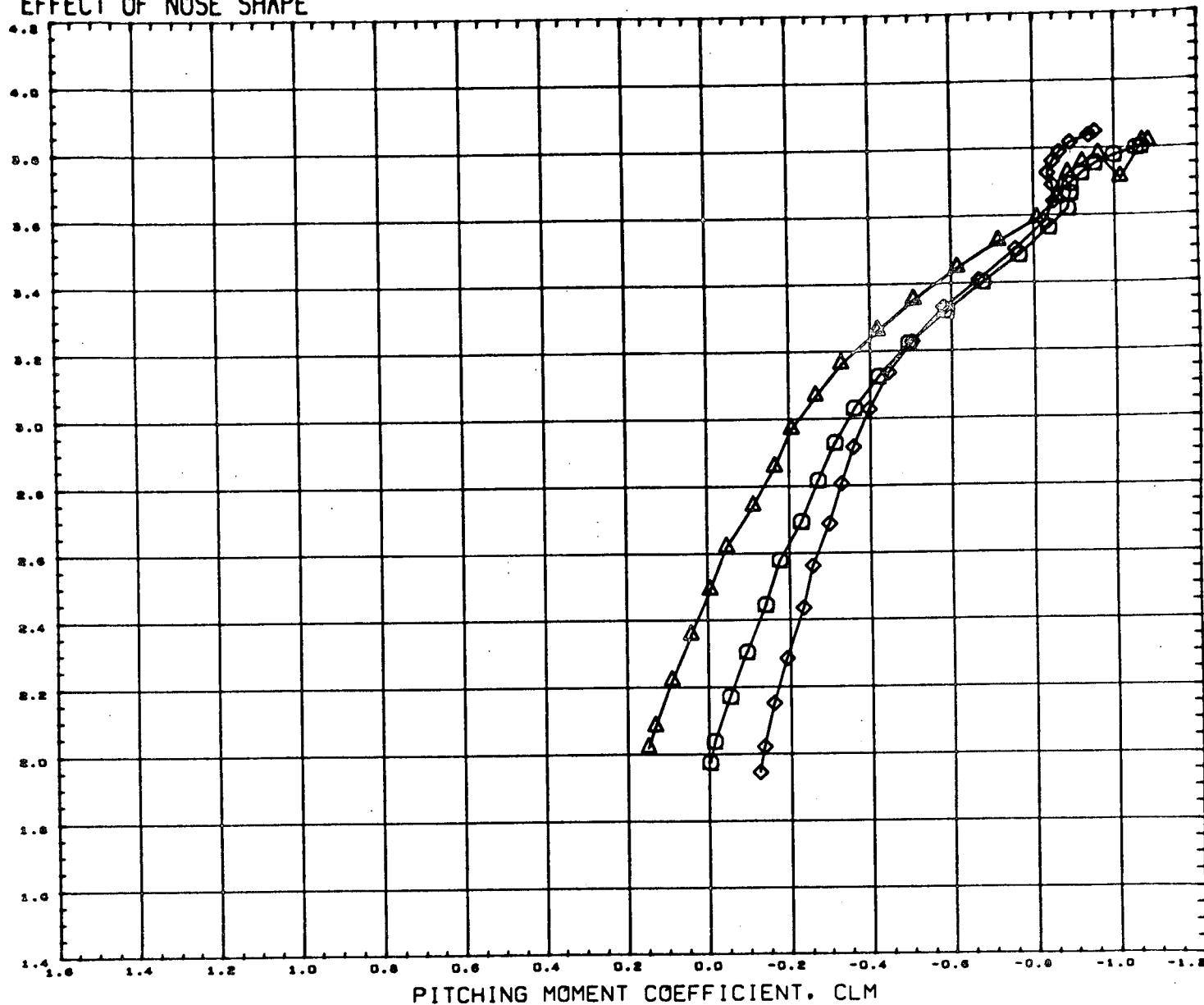
DATA SET SYMBOL CONFIGURATION DESCRIPTION			BETA	H TAIL	ELEVTR	REFERENCE INFORMATION		
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(RCX321)	○	GAC HST-D2D TBC M-32 BOOSTER	B5W5H4	0.000	-15.000	0.000	LREF	1.4680
(RCX301)	◇	GAC HST-D2D TBC M-32 BOOSTER	B9W5H4	0.000	-15.000	0.000	BREF	9.6520

MACH 8.120

PAGE 70

EFFECT OF NOSE SHAPE

NORMAL FORCE COEFFICIENT, CN



PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCX131) GAC HST-D2D TBC H-32 BOOSTER 86W5H4
 (RCX321) GAC HST-D2D TBC H-32 BOOSTER 85W5H4
 (RCX301) GAC HST-D2D TBC H-32 BOOSTER 89W5H4

BETA HTAIL ELEVTR

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0.000	-15.000	0.000
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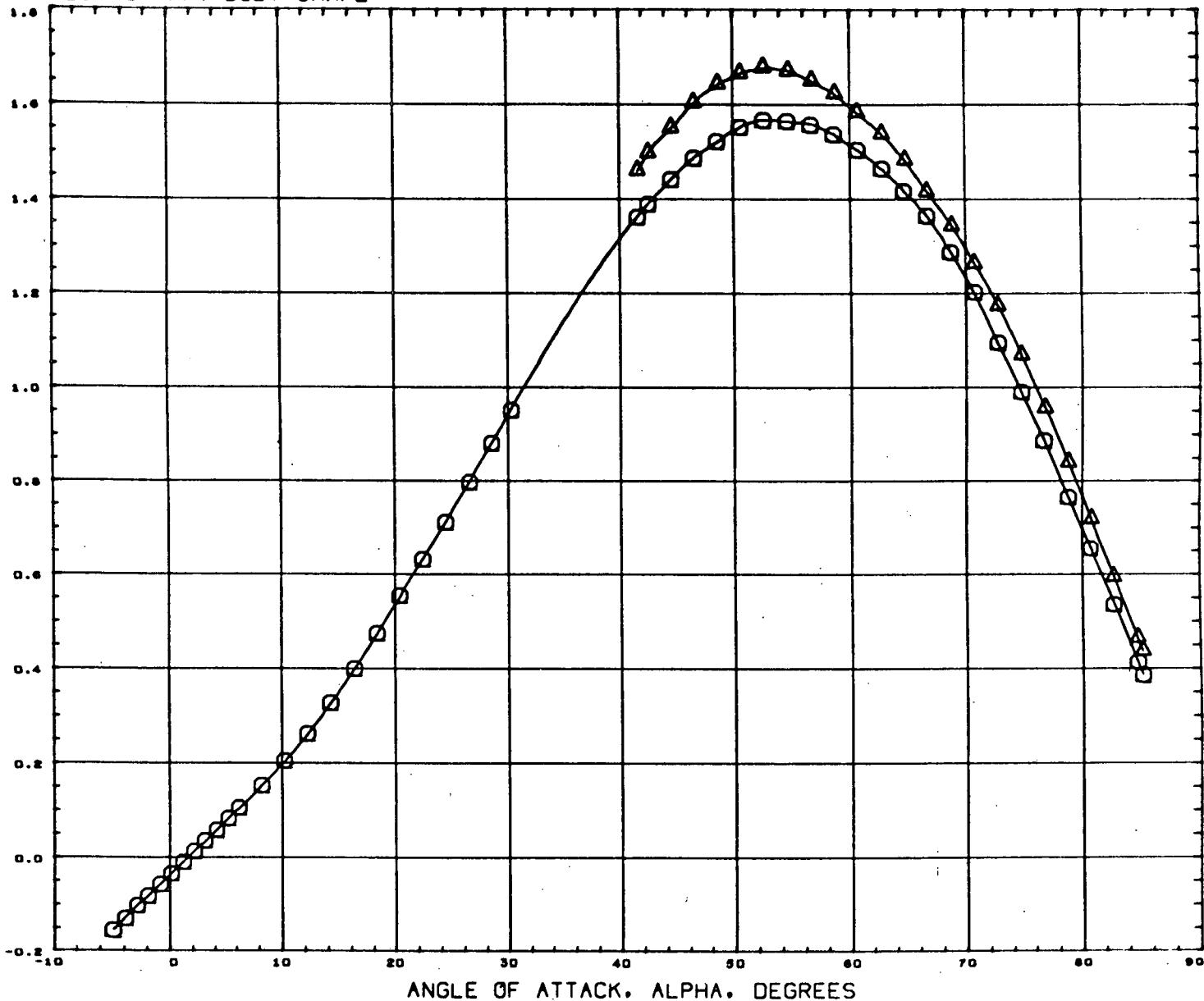
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XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5670	INCHES
SCALE	0.4348	PERCNT

MACH 0.120

PAGE 71

EFFECT OF AFT BODY SHAPE

LIFT COEFFICIENT, CL



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) GAC HST-D2D TBC H-32 BOOSTER B8W4H4V3
 (RCX181) GAC HST-D2D TBC H-32 BOOSTER B7W4H4

BETA HTAIL ELEVTR
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 0.000 -15.000 0.000

REFERENCE INFORMATION
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 XMRP 7.6210 INCHES
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 SCALE 0.4348 PERCNT

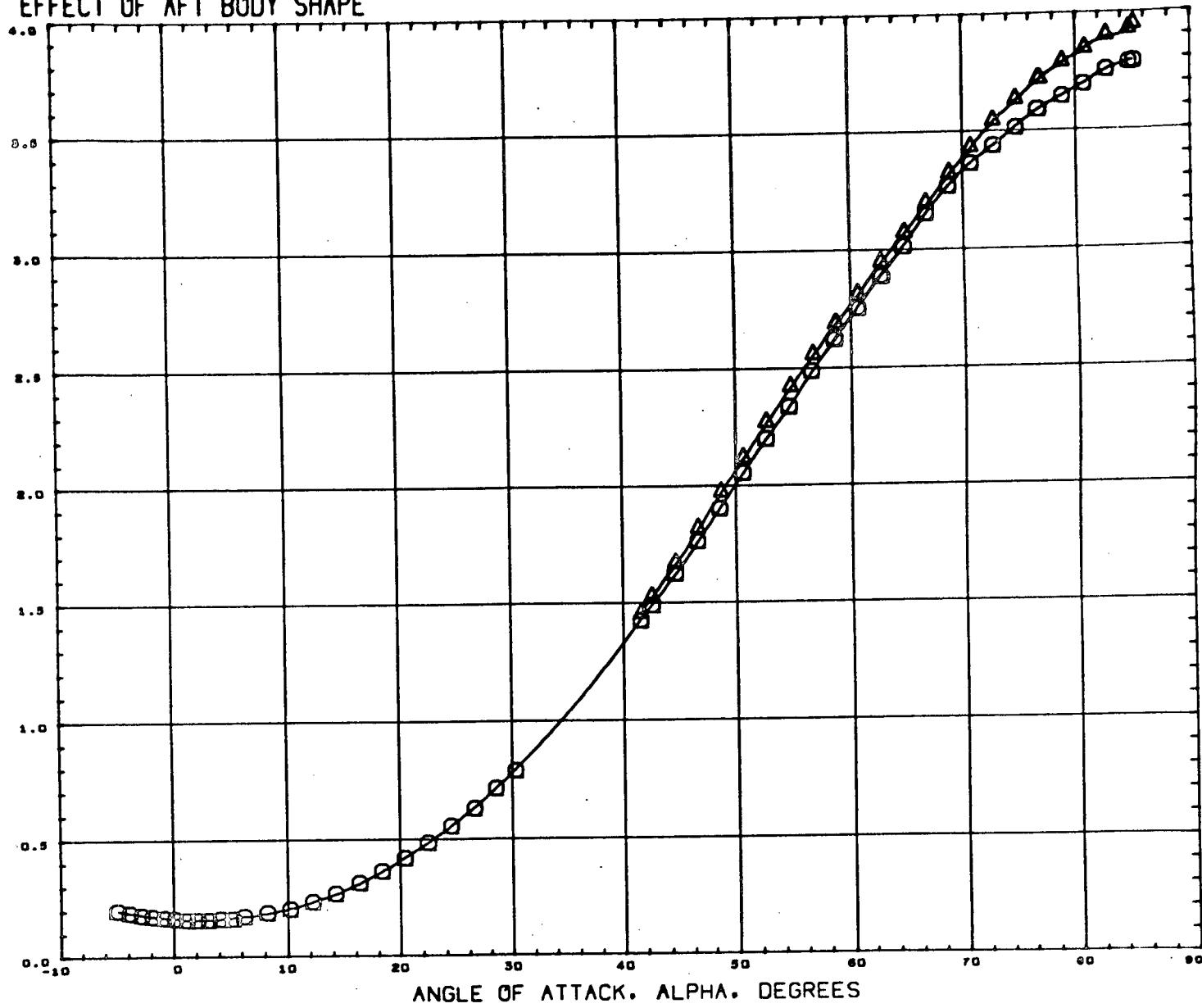
MACH 8.120

PAGE 72

30

EFFECT OF AFT BODY SHAPE

FOREBODY DRAG COEFFICIENT. CDF



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) Q GAC HST-020 TBC H-32 BOOSTER 88W4H4V3
 (RCX181) A GAC HST-020 TBC H-32 BOOSTER 87W4H4

BETA HTAIL ELEVTR
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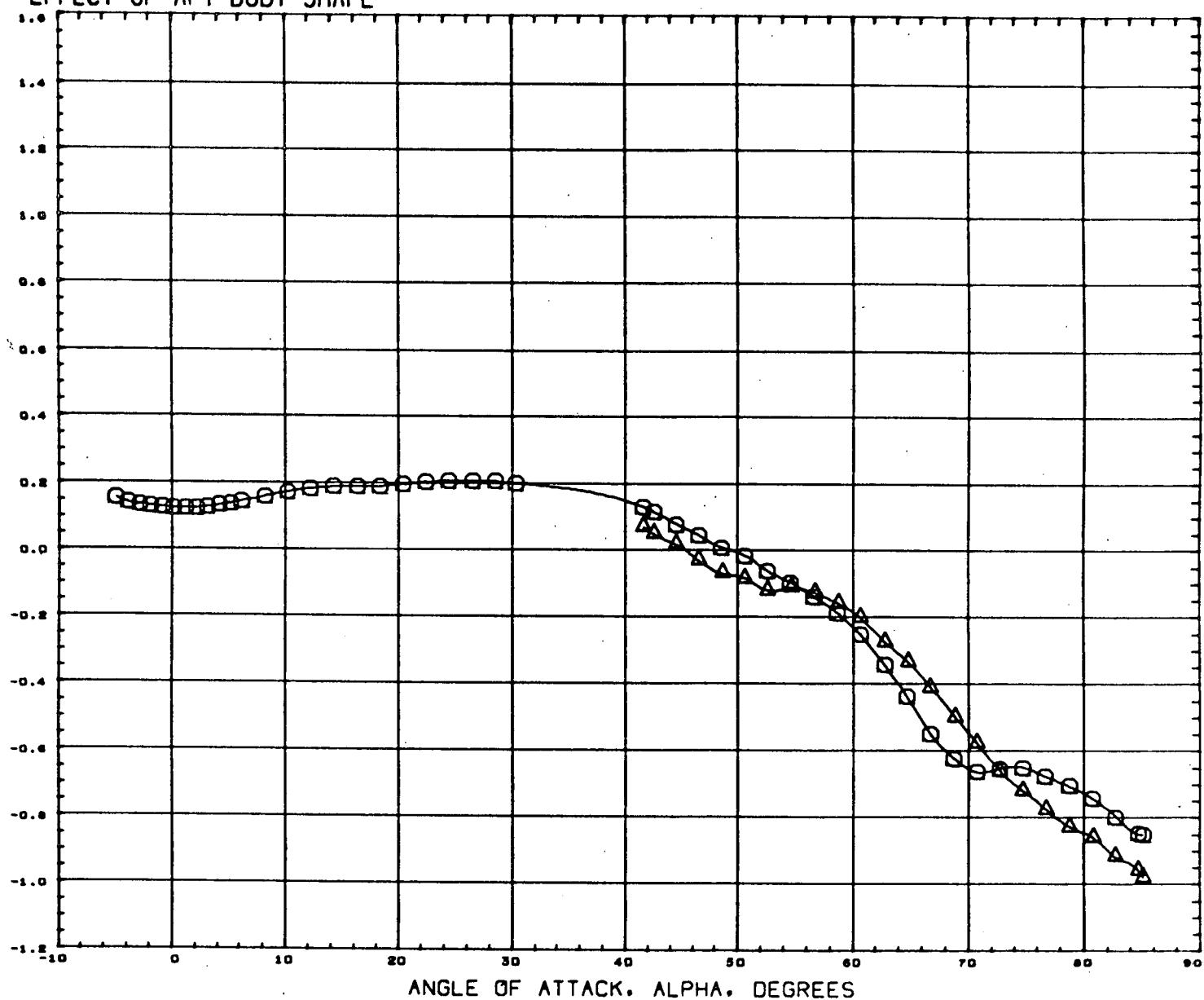
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCENT

MACH 0.120

PAGE 73

EFFECT OF AFT BODY SHAPE

PITCHING MOMENT COEFFICIENT, CLM



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) Q GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCX161) A GAC HST-020 TBC H-32 BOOSTER B7W4H4

BETA HTAIL ELEVTR
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 0.000 -15.000 0.000

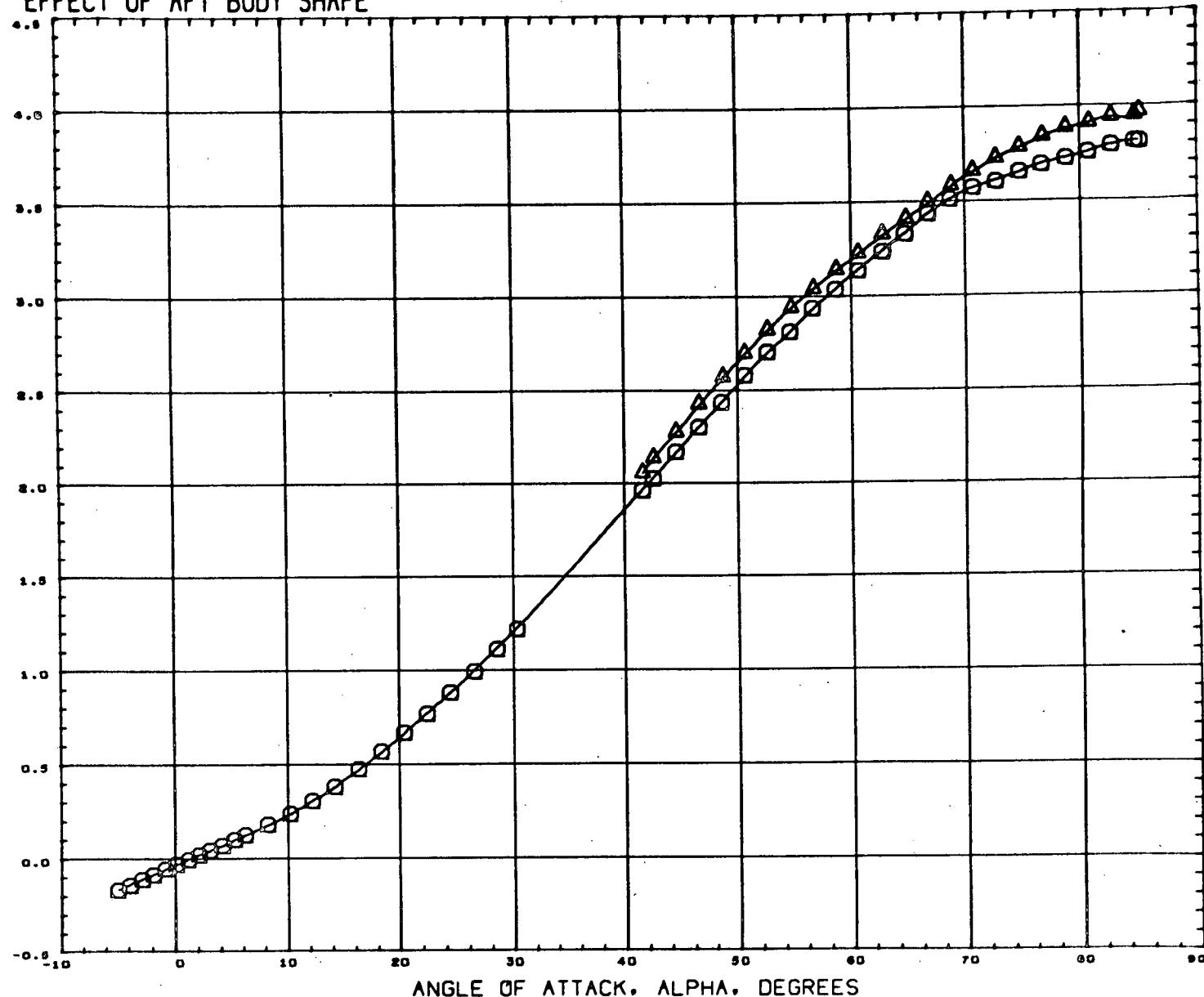
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4340 PERCNT

MACH 0.120

PAGE 74

EFFECT OF AFT BODY SHAPE

NORMAL FORCE COEFFICIENT, CN



ANGLE OF ATTACK, ALPHA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCXD81) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCX161) GAC HST-020 TBC H-32 BOOSTER B7W4H4

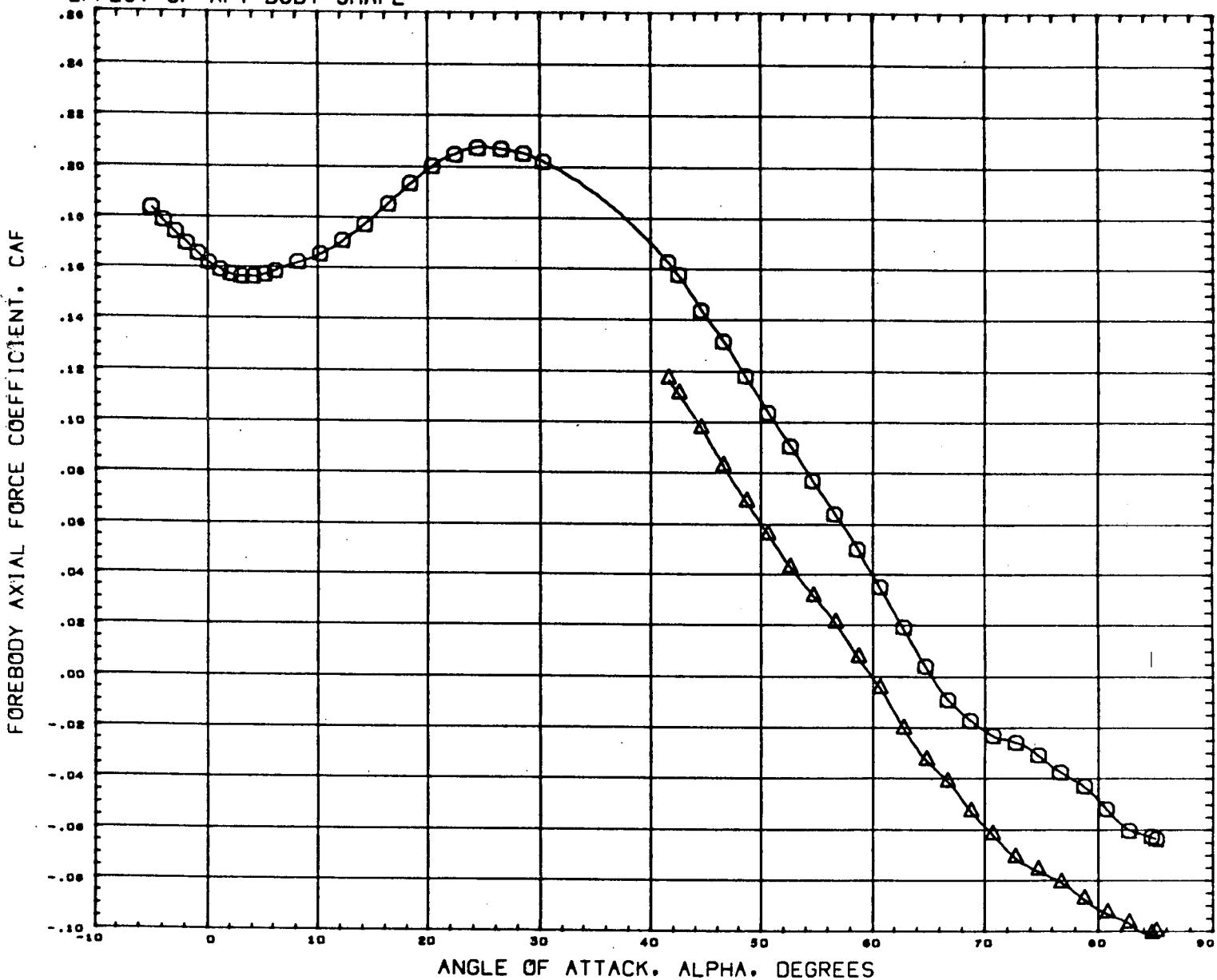
BETA HTAIL ELEVTR
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 0.000 -15.000 0.000

REFERENCE INFORMATION		
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BREF	9.6520	INCHES
XMRP	7.0210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.3870	INCHES
SCALE	0.4348	PERCNT

MACH 8.120

PAGE 75

EFFECT OF AFT BODY SHAPE



DATA SET SYMBOL CONFIGURATION DESCRIPTION

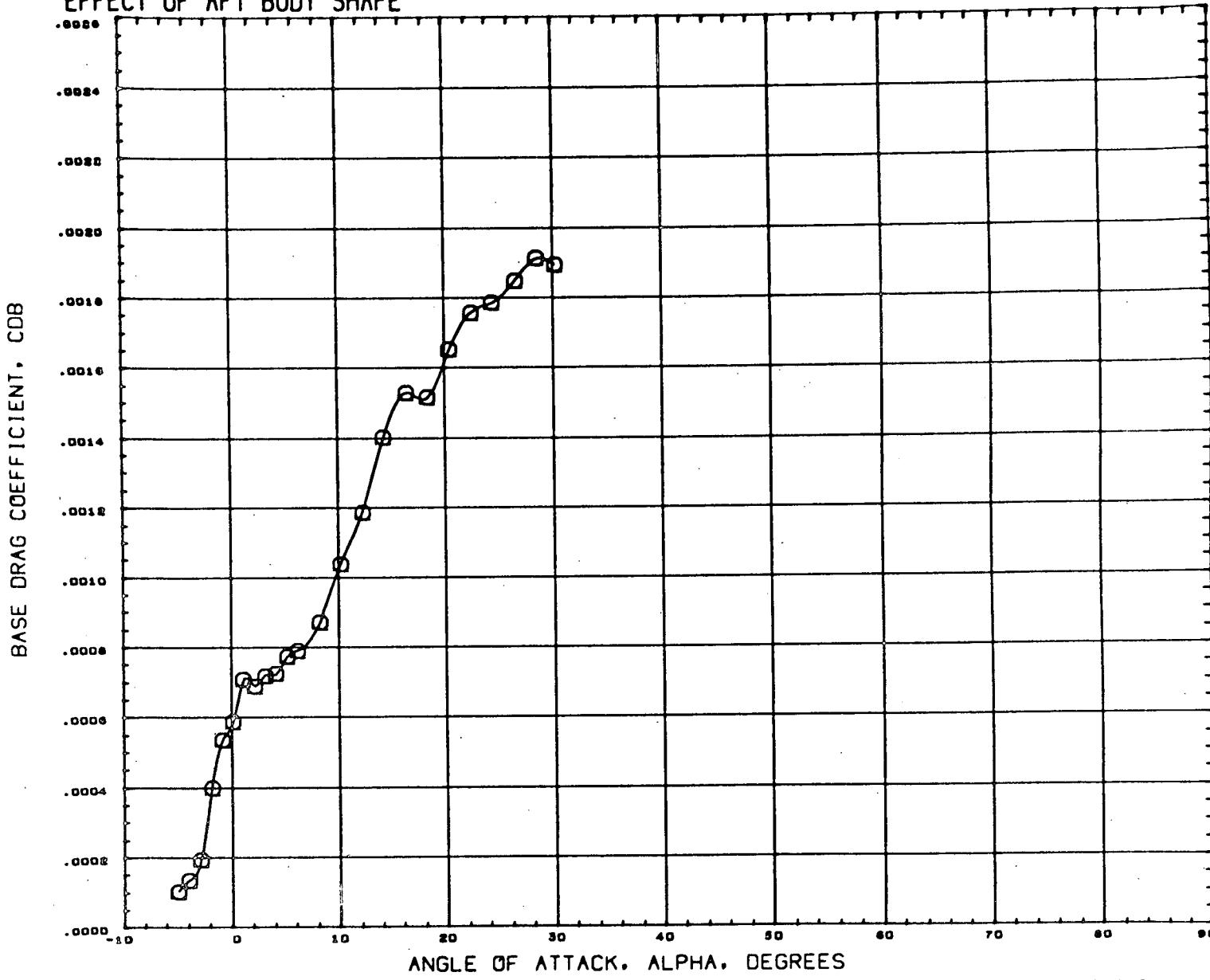
(GCX081) GAC MST-020 TBC H-32 BOOSTER B8W4H4V3
(RCX181) GAC MST-020 TBC H-32 BOOSTER B7W4H4

BETA HTAIL ELEVTR
0.000 -15.000 0.000
0.000 -15.000 0.000

REFERENCE INFORMATION
SREF 13.3440 30. IN.
LREF 1.4660 INCHES
BREF 9.6520 INCHES
XMRP 7.6210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5670 INCHES
SCALE 0.4346 PERCENT

MACH 8.120

EFFECT OF AFT BODY SHAPE



SYMBOL MACH PARAMETRIC VALUES
□ 8.120 BETA 0.000 HTAIL - 15.000
 ELEVTR 0.000

DATA MIST. CODE MVT&EV

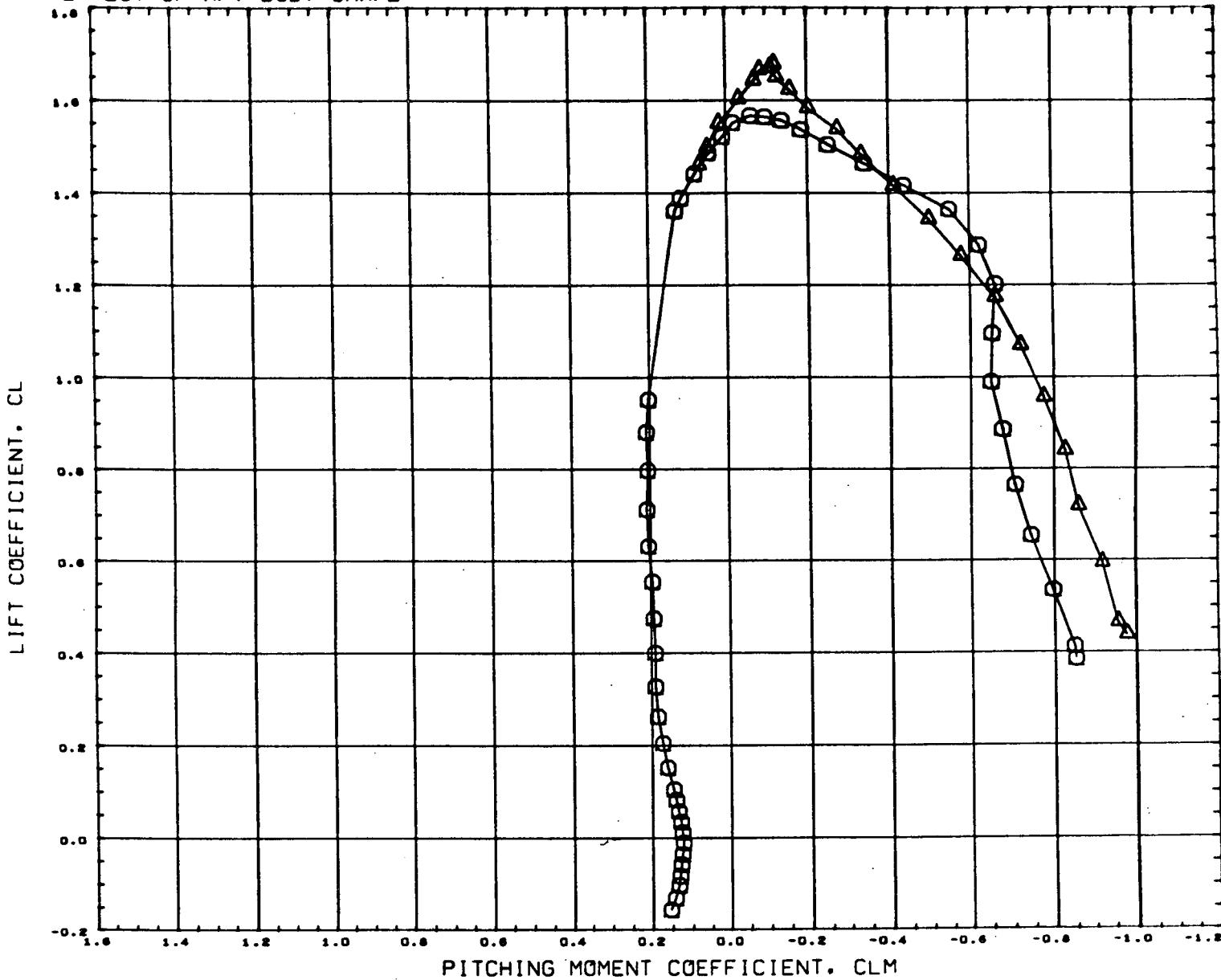
GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

REFERENCE INFORMATION		
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XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.3670	INCHES
SCALE	0.4348	PERCNT

(FCX222) 05 AUG 71

PAGE 77

EFFECT OF AFT BODY SHAPE



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX001) Q GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCX101) R GAC HST-020 TBC H-32 BOOSTER B7W4H4

BETA HTAIL ELEVTR
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 0.000 -15.000 0.000

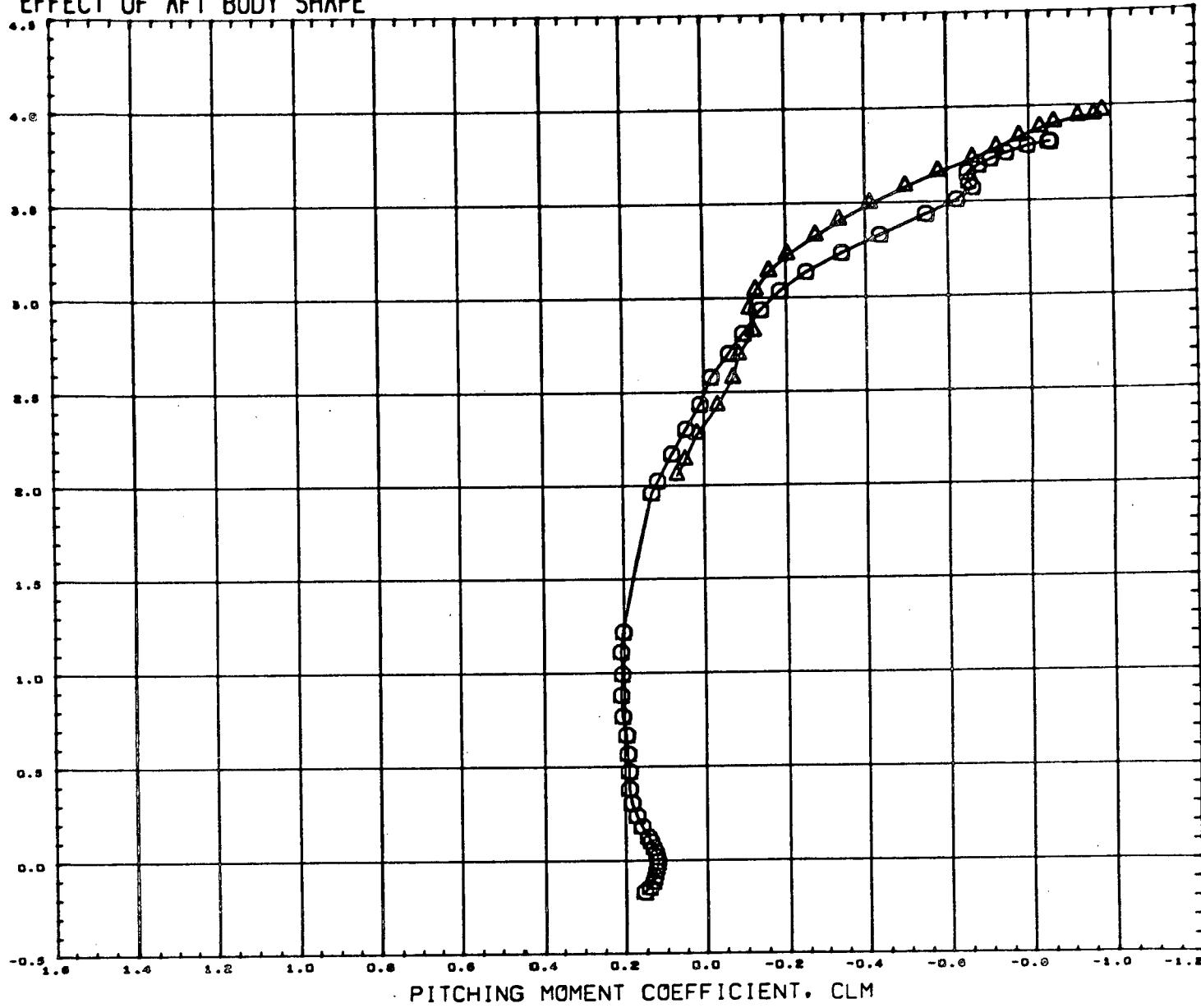
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BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4348	PERCNT

MACH 8.120

PAGE 78

EFFECT OF AFT BODY SHAPE

NORMAL FORCE COEFFICIENT, CN



PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (GCX081) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (RCX101) GAC HST-020 TBC H-32 BOOSTER B7W4H4

BETA HTAIL ELEVTR
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 0.000 -15.000 0.000

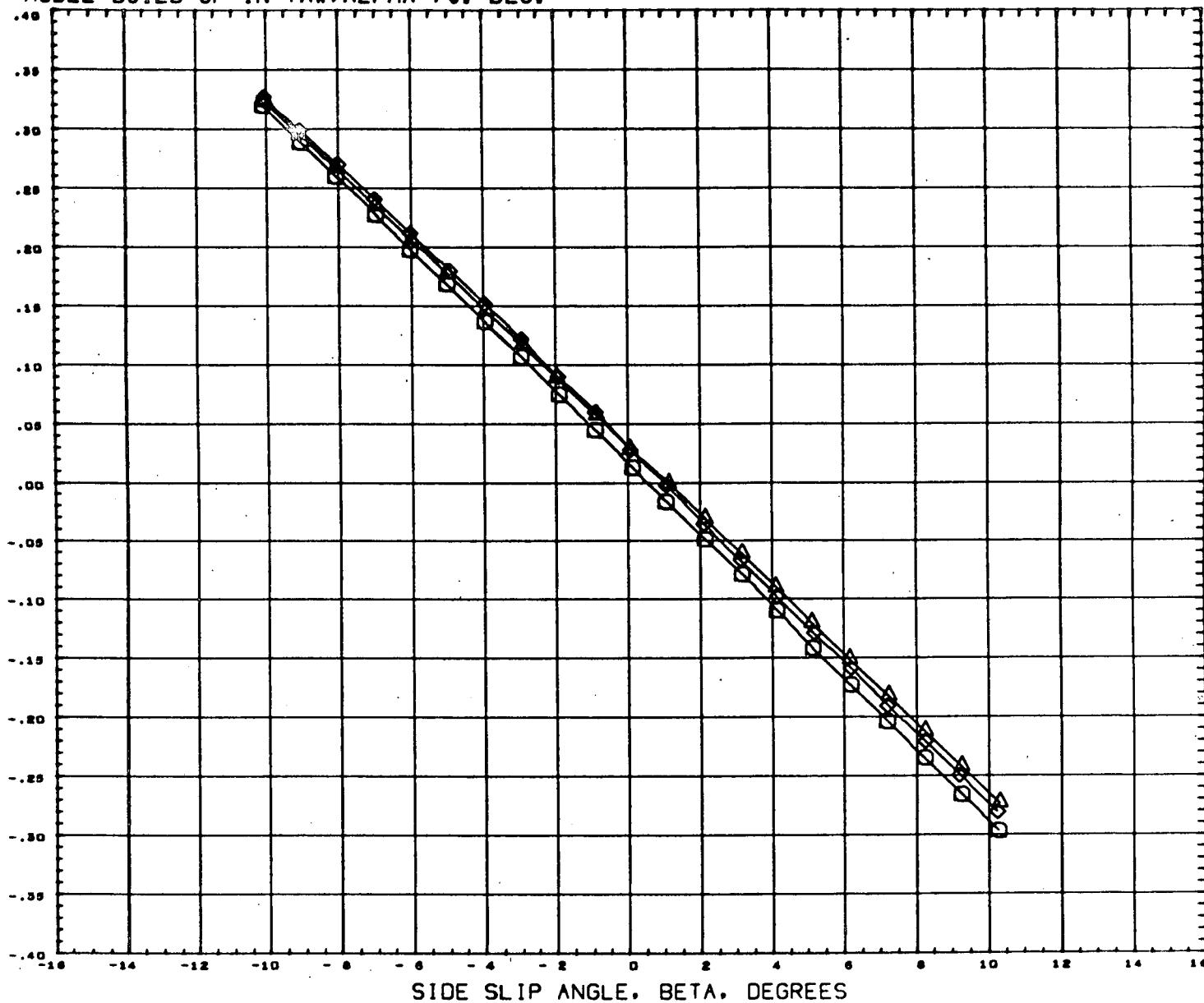
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XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4340	PERCNT

MACH 8.120

PAGE 79

MODEL BUILD-UP IN YAW, ALPHA=70. DEG.

LATERAL FORCE COEFFICIENT, CY



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX013) Q GAC HST-020 TBC H-32 BOOSTER B6
 (FCX023) A GAC HST-020 TBC H-32 BOOSTER B6W4
 (FCX063) D GAC HST-020 TBC H-32 BOOSTER B6W4H4

ALPHA ELEVTR MTAIL
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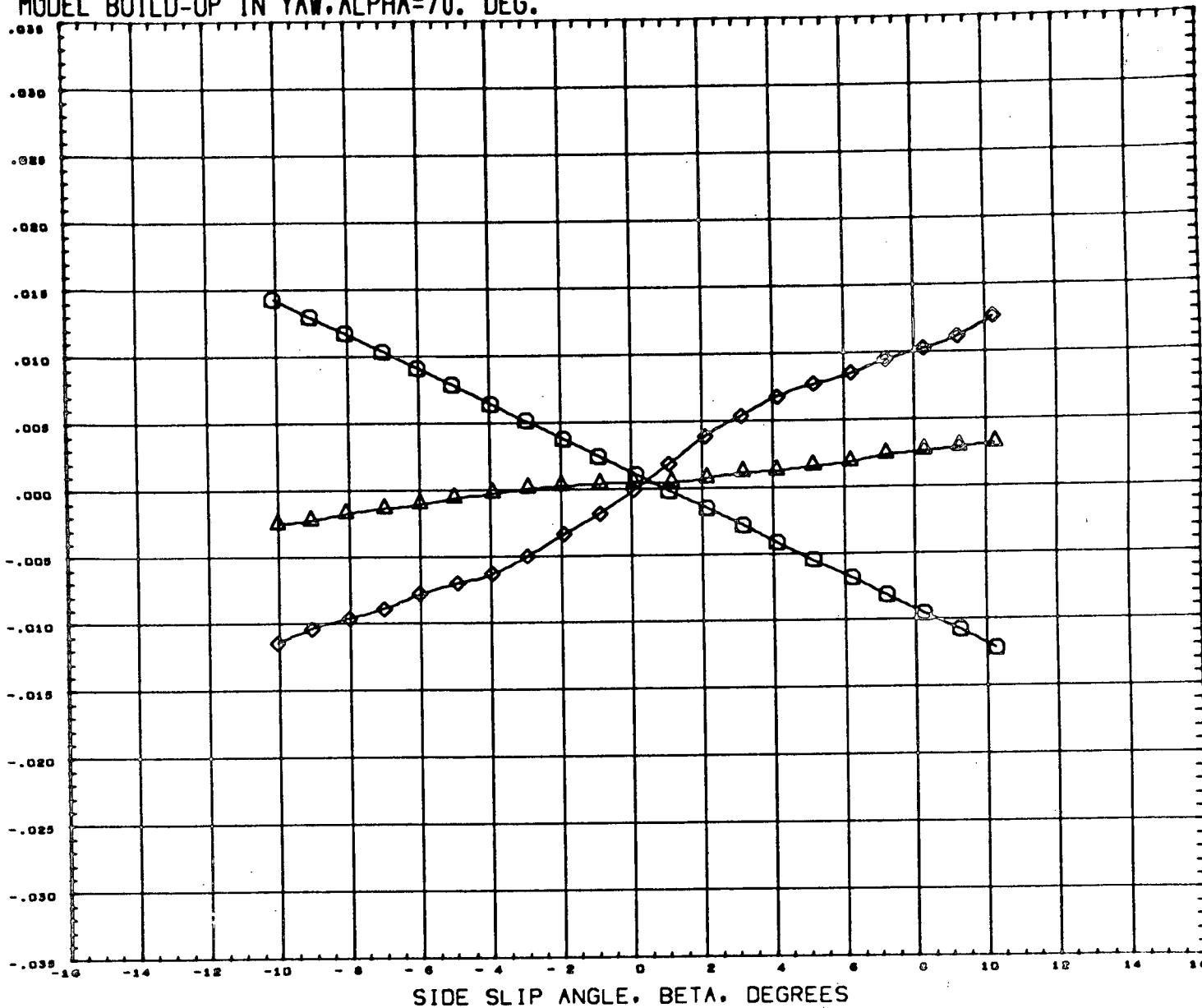
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCENT

MACH 8.120

PAGE 80

MODEL BUILD-UP IN YAW, ALPHA=70. DEG.

YAWING MOMENT COEFFICIENT, CLN (STABILITY AXIS)



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX013) GAC HST-020 TBC H-32 BOOSTER B6
 (FCX023) GAC HST-020 TBC H-32 BOOSTER B6W4
 (FCX063) GAC HST-020 TBC H-32 BOOSTER B6W4H4

ALPHA ELEVTR HTAIL
 70.000 0.000 -15.000

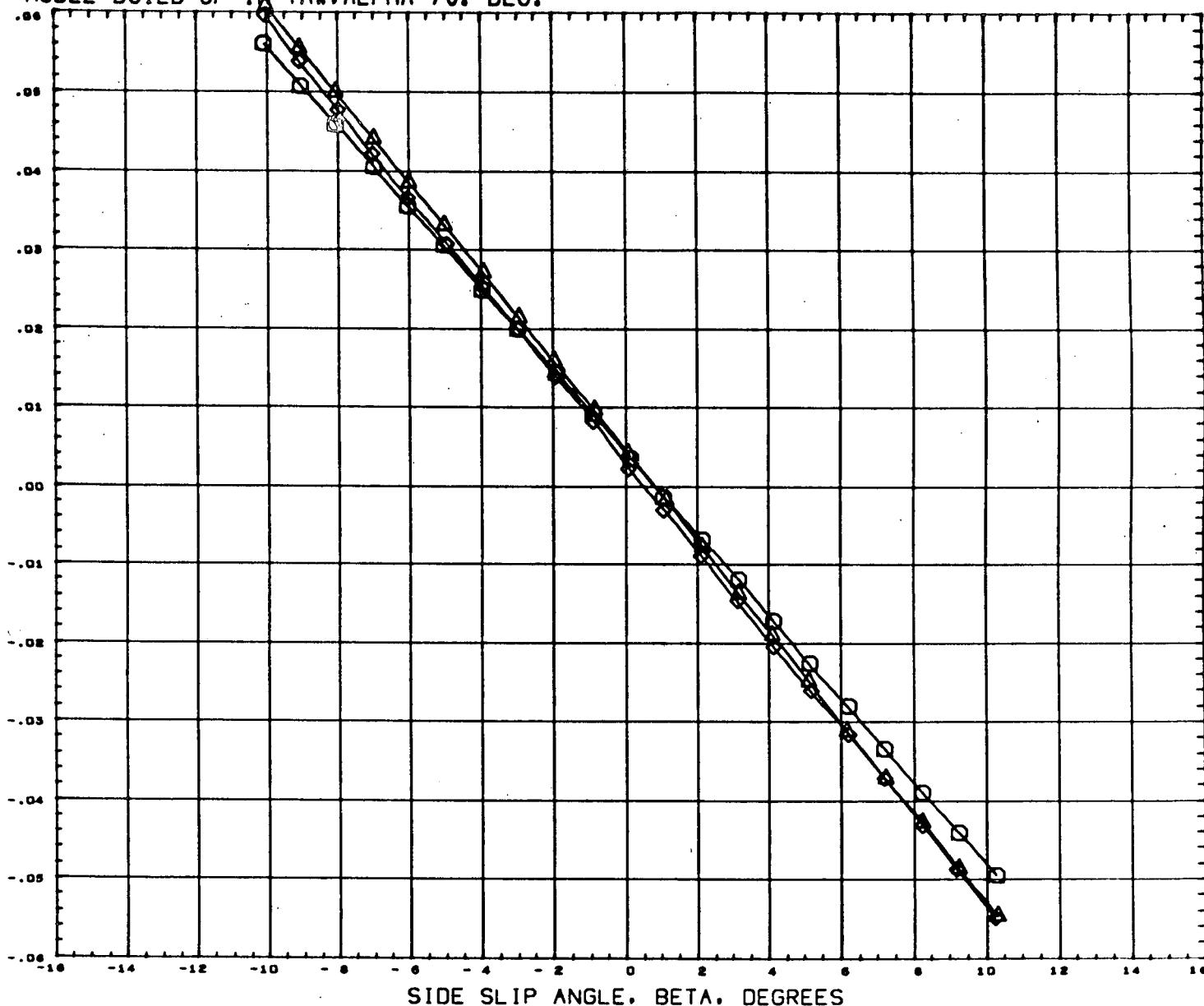
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 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5670 INCHES
 SCALE 0.4346 PERCENT

MACH 6.120

PAGE 81

MODEL BUILD-UP IN YAW, ALPHA=70. DEG.

ROLLING MOMENT COEFFICIENT, CSL (STABILITY AXIS)



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX013) GAC HST-020 TBC H-32 BOOSTER B6
 (FCX023) GAC HST-020 TBC H-32 BOOSTER B6W4
 (FCX063) GAC HST-020 TBC H-32 BOOSTER B6W4H4

ALPHA ELEVTR HTAIL

70.000 0.000 -15.000

REFERENCE INFORMATION

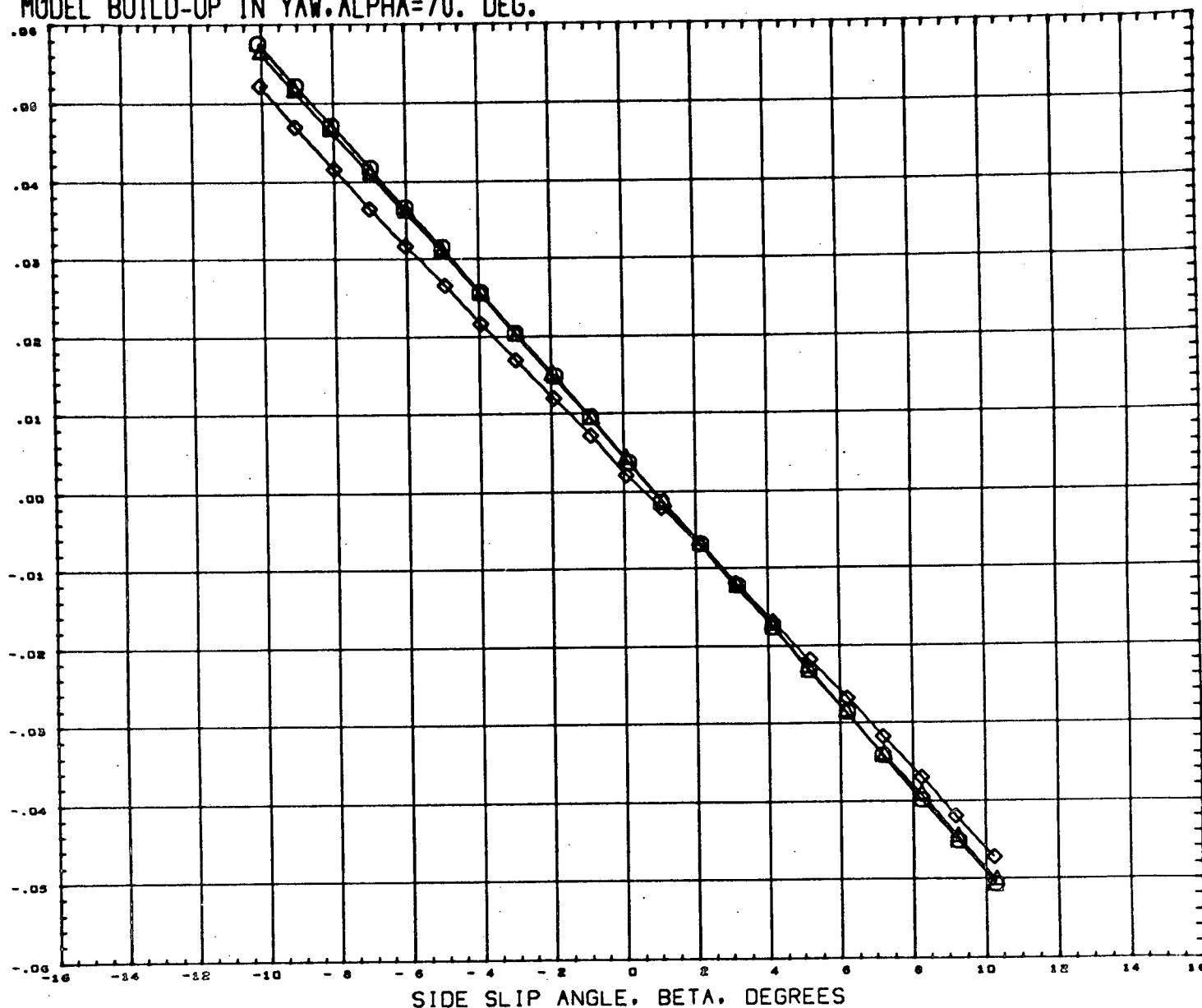
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BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4348	PERCENT

MACH 8.120

PAGE 82

MODEL BUILD-UP IN YAW. ALPHA=70. DEG.

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX013) GAC HST-020 TBC H-32 BOOSTER B6
 (FCX023) GAC HST-020 TBC H-32 BOOSTER B6W4
 (FCX033) GAC HST-020 TBC H-32 BOOSTER B6W4H4

ALPHA ELEVTR HTAIL
 70.000 0.000 -15.000

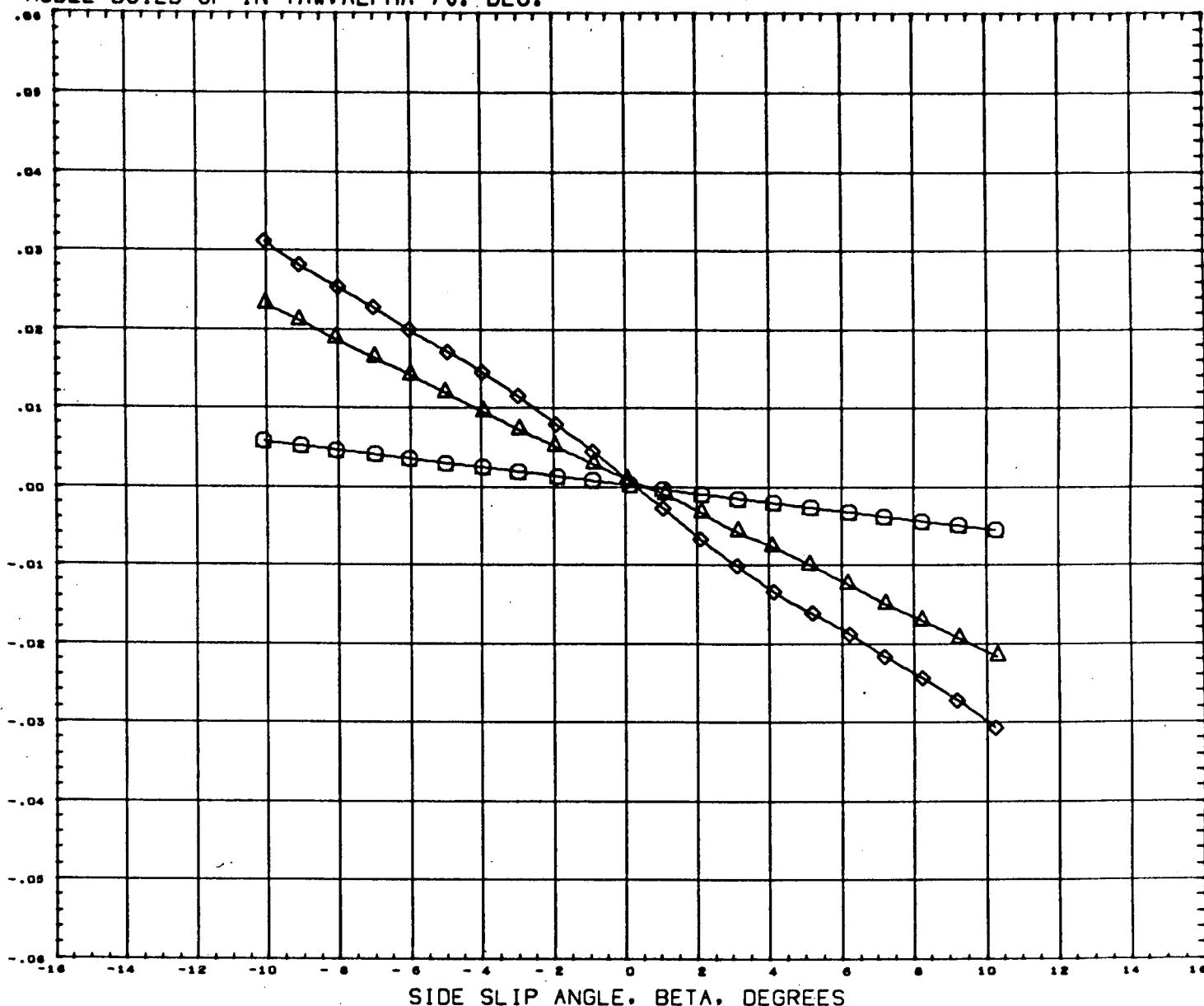
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 BREF 9.6920 INCHES
 XMRP 7.0210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5670 INCHES
 SCALE 0.4348 PERCNT

MACH 0.120

PAGE 83

MODEL BUILD-UP IN YAW, ALPHA=70. DEG.

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX013) GAC HST-020 TBC H-32 BOOSTER
 (FCX023) GAC HST-020 TBC H-32 BOOSTER
 (FCX083) GAC HST-020 TBC H-32 BOOSTER

B6
B6W4
B6W4H4

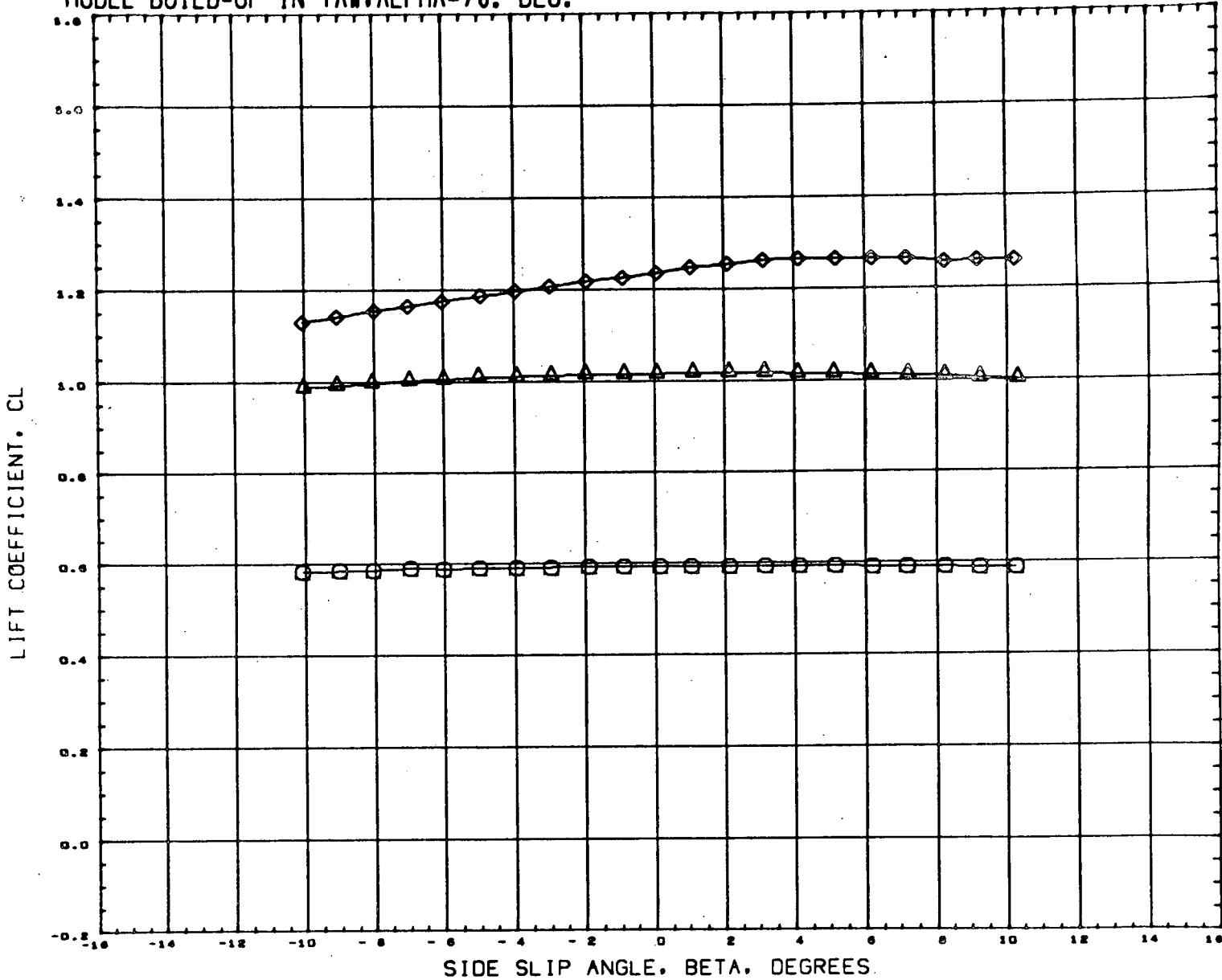
ALPHA ELEVTR HTAIL
70.000 0.000 -15.000

REFERENCE INFORMATION
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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMNP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

PAGE 84

MODEL BUILD-UP IN YAW, ALPHA=70. DEG.



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX013) GAC HST-020 TBC H-32 BOOSTER B6
 (FCX023) GAC HST-020 TBC H-32 BOOSTER B6W4
 (FCX033) GAC HST-020 TBC H-32 BOOSTER B6W4H4

ALPHA ELEVTR HTAIL
 70.000 0.000 -15.000

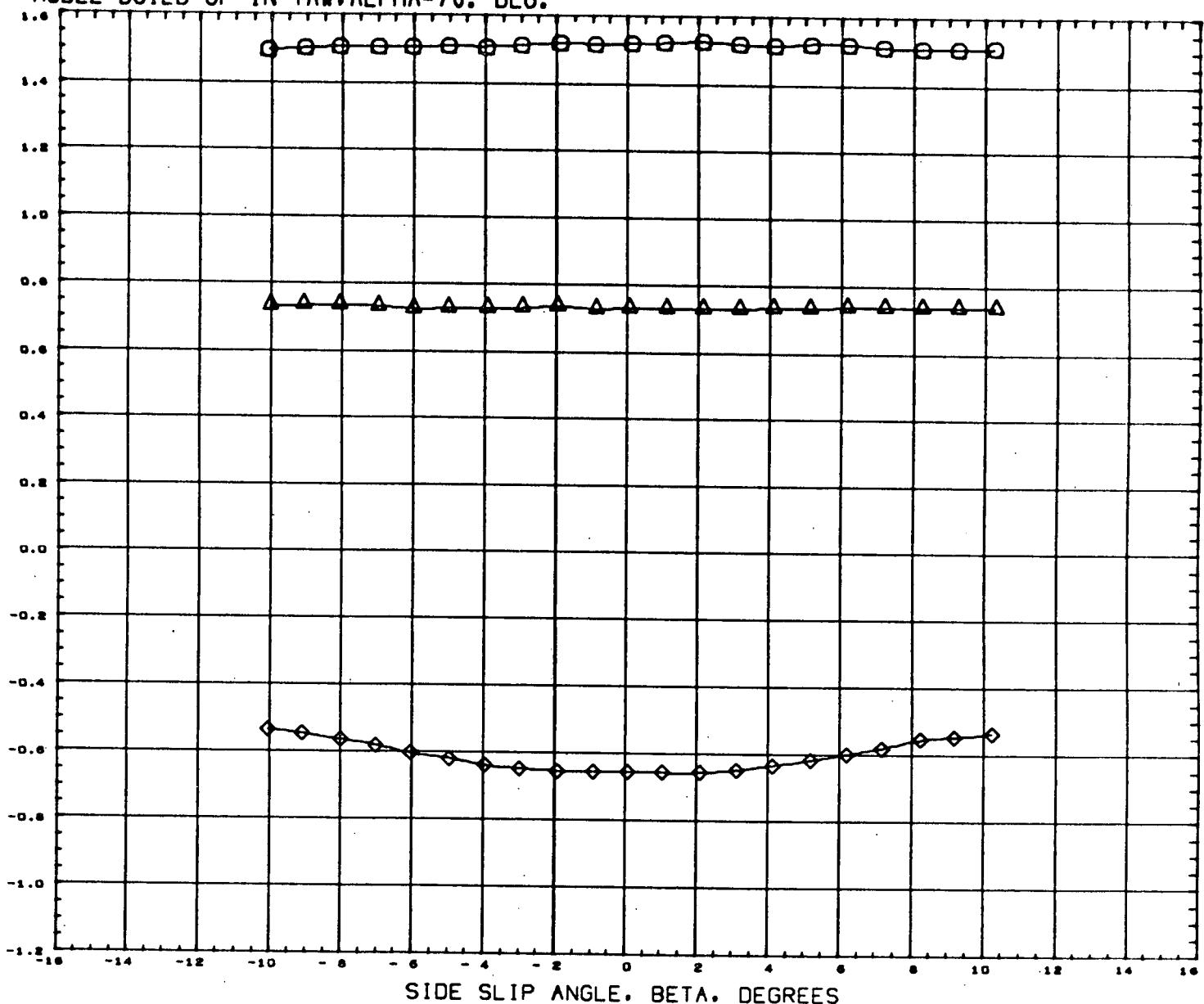
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 BREF 9.6520 INCHES
 XMRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

PAGE 85

MODEL BUILD-UP IN YAW, ALPHA=70. DEG.

PITCHING MOMENT COEFFICIENT. CLM



SIDE SLIP ANGLE. BETA. DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX013) GAC HST-020 TBC H-32 BOOSTER B6
 (FCX023) GAC HST-020 TBC H-32 BOOSTER B6W4
 (FCX033) GAC HST-020 TBC H-32 BOOSTER B6W4H4

ALPHA ELEVTR HTAIL

70.000		
70.000		
70.000	0.000	-15.000

REFERENCE INFORMATION

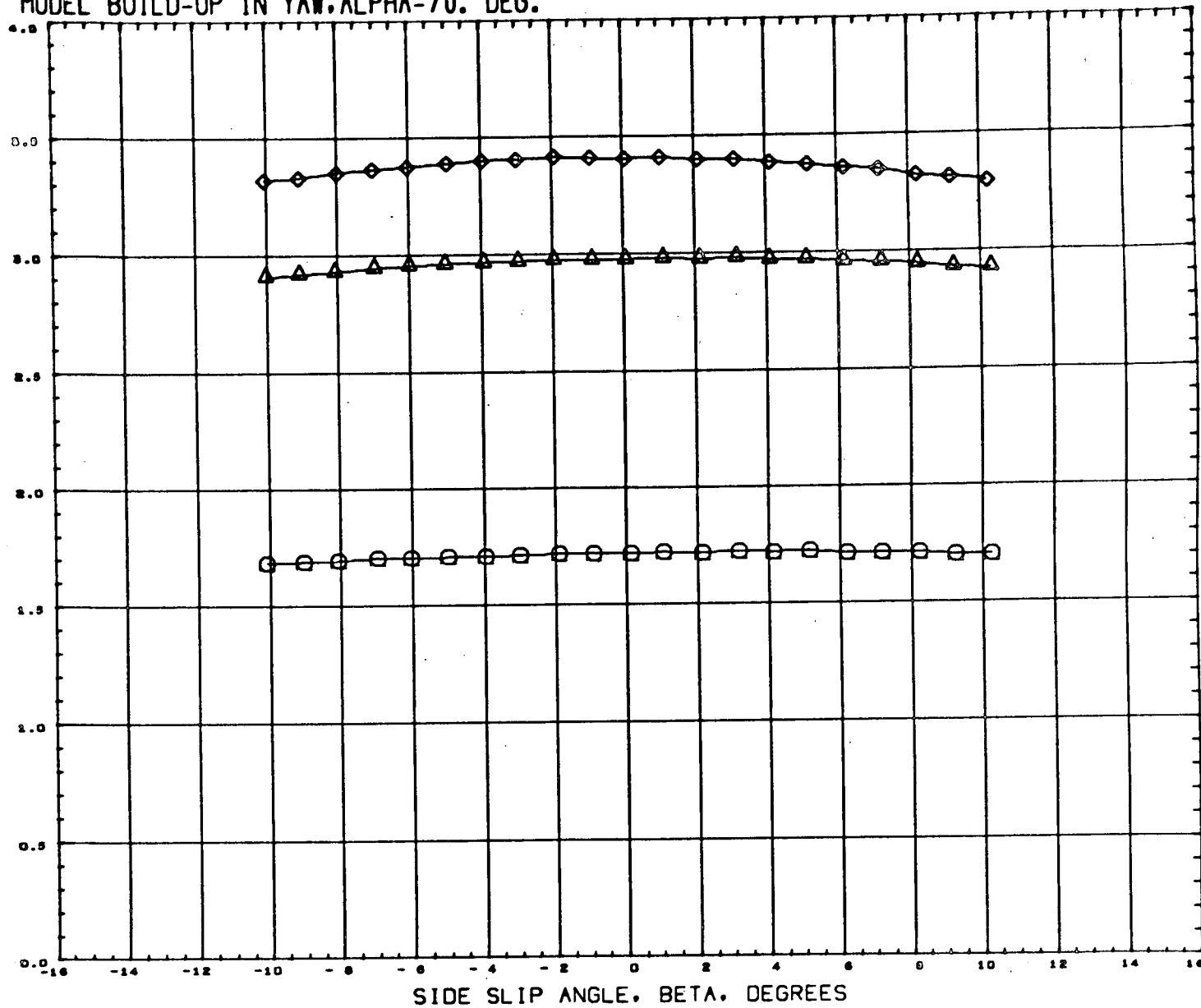
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BREF	9.6520	INCHES
XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.3870	INCHES
SCALE	0.4348	PERCNT

MACH 8.120

PAGE 86

MODEL BUILD-UP IN YAW, ALPHA=70. DEG.

FOREBODY DRAG COEFFICIENT, CDF



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX013) Q GAC HST-020 TBC H-32 BOOSTER B6
 (FCX023) L GAC HST-020 TBC H-32 BOOSTER B6W4
 (FCX033) D GAC HST-020 TBC H-32 BOOSTER B6W4H4

ALPHA ELEVTR HTAIL
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 70.000 0.000 -15.000

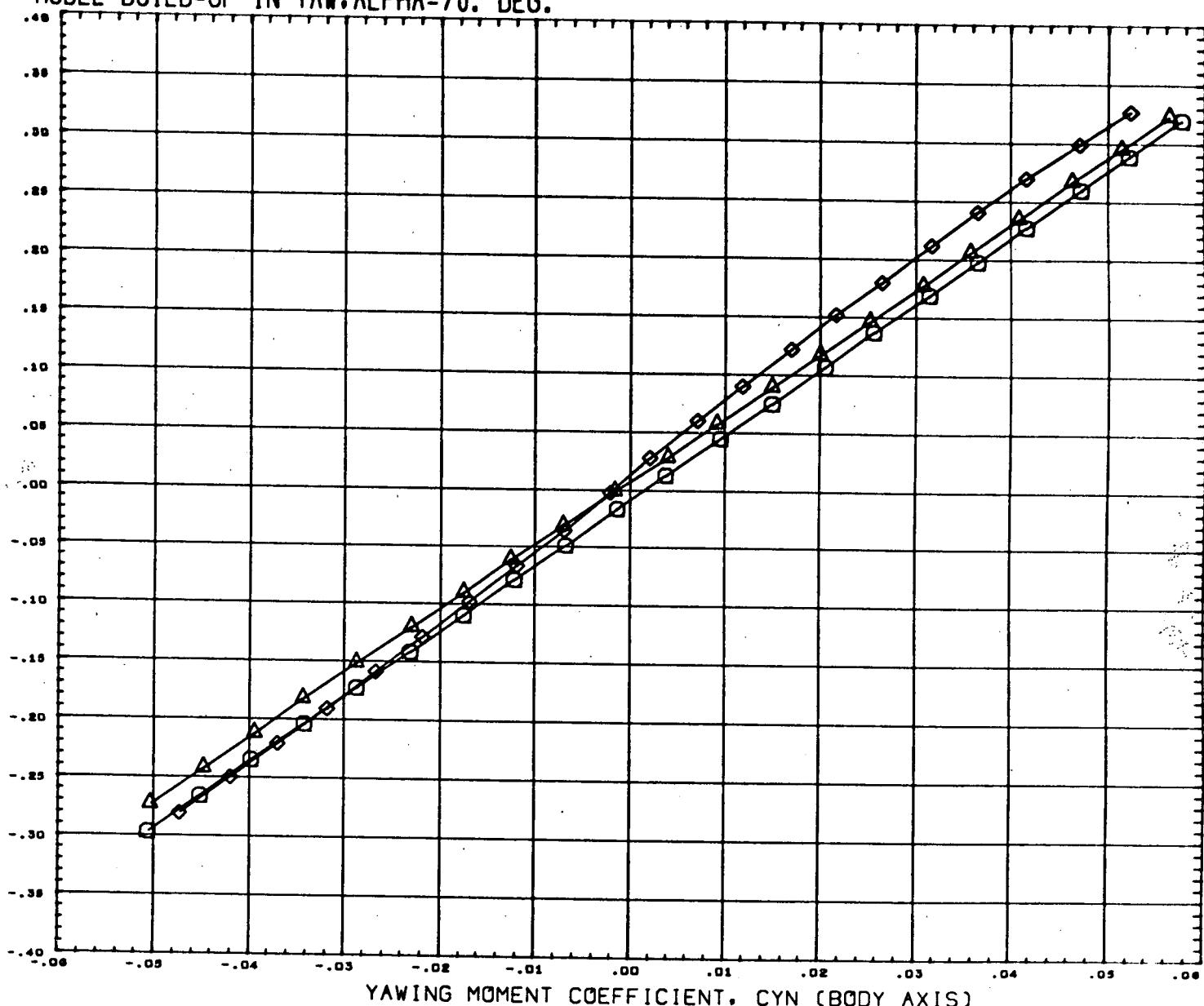
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 LREF 1.4680 INCHES
 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4340 PERCENT

MACH 0.120

PAGE 87

MODEL BUILD-UP IN YAW, ALPHA=70. DEG.

LATERAL FORCE COEFFICIENT, CY



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX013) GAC HST-020 TBC H-32 BOOSTER B6
 (FCX023) GAC HST-020 TBC H-32 BOOSTER B6W4
 (FCX063) GAC HST-020 TBC H-32 BOOSTER B6W4H4

ALPHA ELEVTR HTAIL

70.000 0.000 -15.000

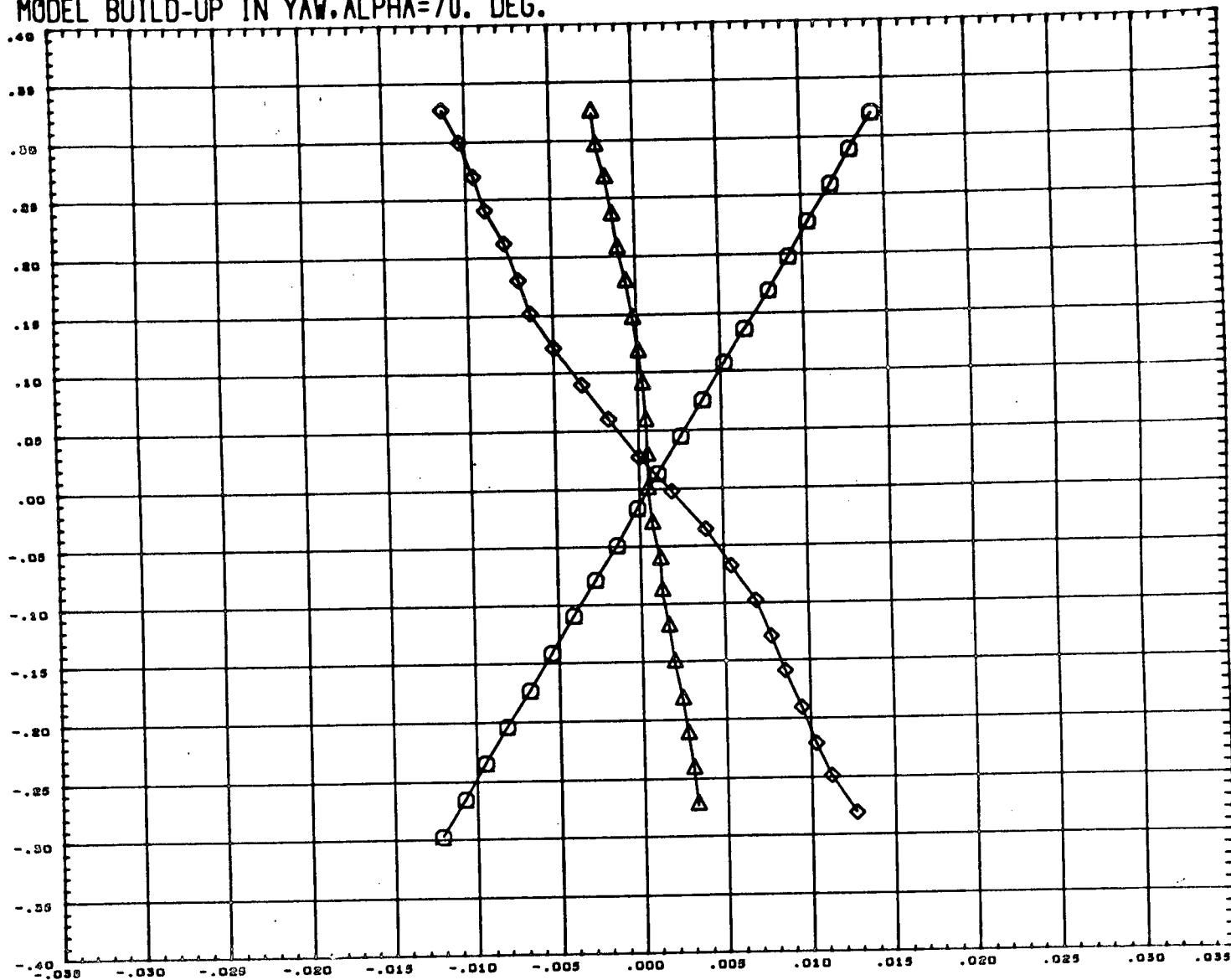
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LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.9870	INCHES
SCALE	0.4348	PERCENT

MACH 0.120

MODEL BUILD-UP IN YAW, ALPHA=70. DEG.

LATERAL FORCE COEFFICIENT, CY



YAWING MOMENT COEFFICIENT, CLN (STABILITY AXIS)

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	B6	B6W4	B6W4H4
(FCX013)	○	GAC HST-020 TBC H-32 BOOSTER			
(FCX023)	△	GAC HST-020 TBC H-32 BOOSTER			
(FCX063)	◇	GAC HST-020 TBC H-32 BOOSTER			

ALPHA	ELEVTR	HTAIL
70.000		
70.000		
70.000	0.000	-15.000

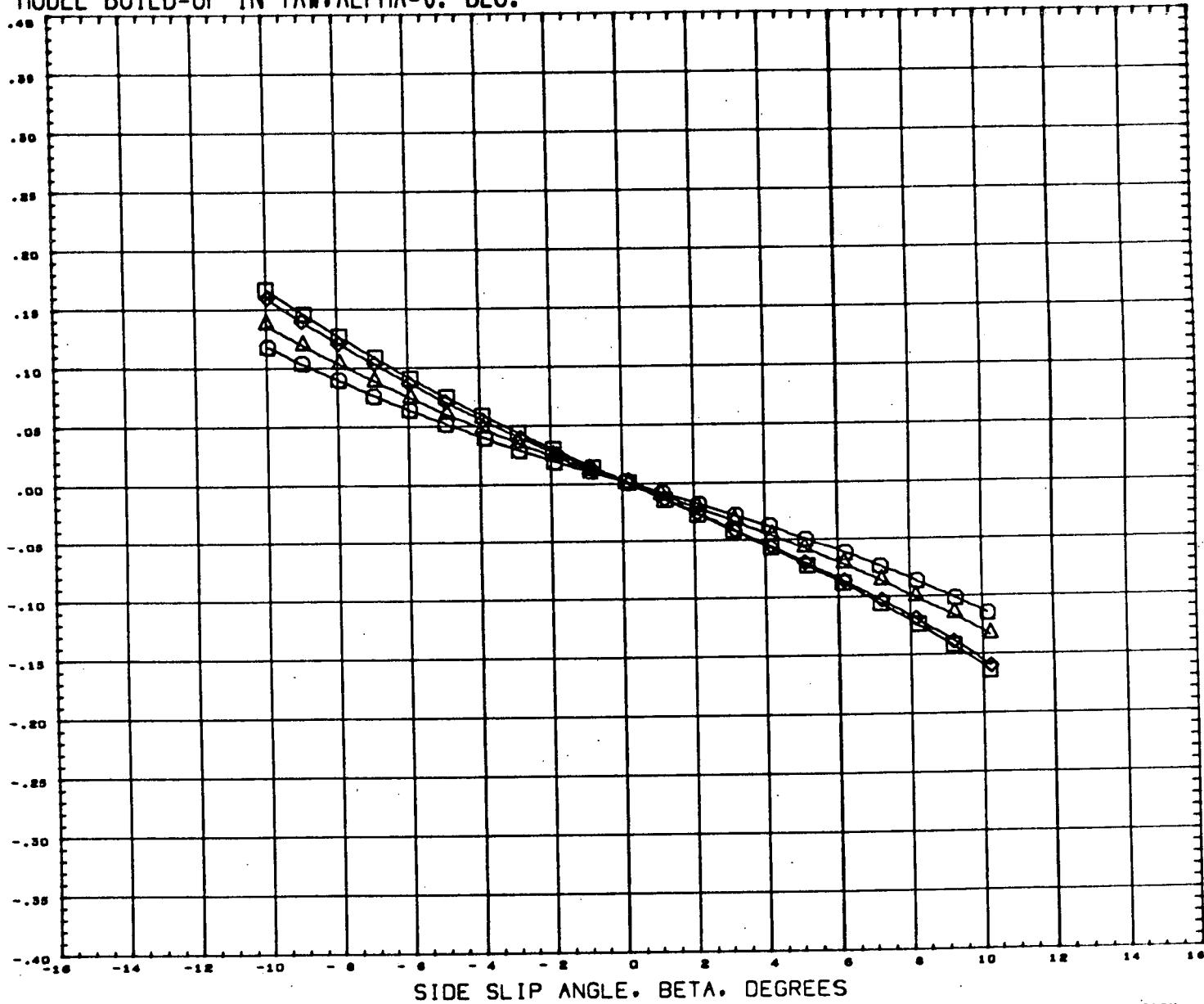
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LREF 1.4680 INCHES
BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4340 PERCENT

MACH 6.120

PAGE 89

MODEL BUILD-UP IN YAW, ALPHA=0, DEG.

LATERAL FORCE COEFFICIENT, CY



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX264) GAC HST-020 TBC H-32 BOOSTER B6
 (FCX294) GAC HST-020 TBC H-32 BOOSTER B6W4
 (FCX204) GAC HST-020 TBC H-32 BOOSTER B6W4V3
 (FCX224) GAC HST-020 TBC H-32 BOOSTER B6W4H4V3

ALPHA ELEVTR HTAIL
 0.000 0.000 0.000
 0.000 0.000 0.000
 0.000 0.000 0.000
 0.000 -15.000

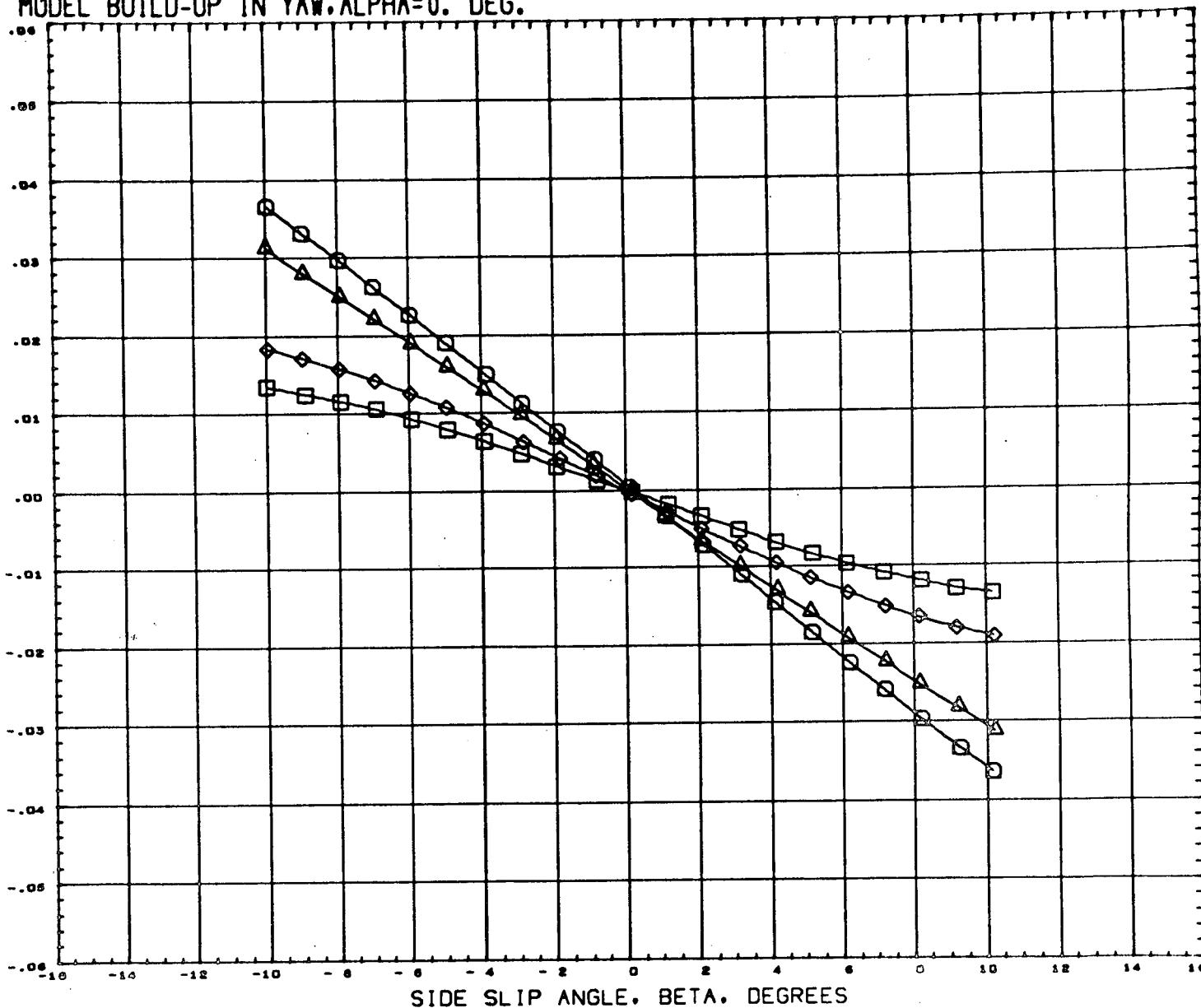
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 LREF 1.4680 INCHES
 BREF 0.6920 INCHES
 XMRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4346 PERCNT

MACH 0.120

PAGE 90

MODEL BUILD-UP IN YAW. ALPHA=0. DEG.

YAWING MOMENT COEFFICIENT. CYN (BODY AXIS)



SIDE SLIP ANGLE. BETA. DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	B8	B8W4	B8W4V3
(FCX284)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000
(FCX294)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000
(FCX204)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000
(FCX224)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000

ALPHA	ELEVTR	HTAIL
0.000	0.000	-15.000

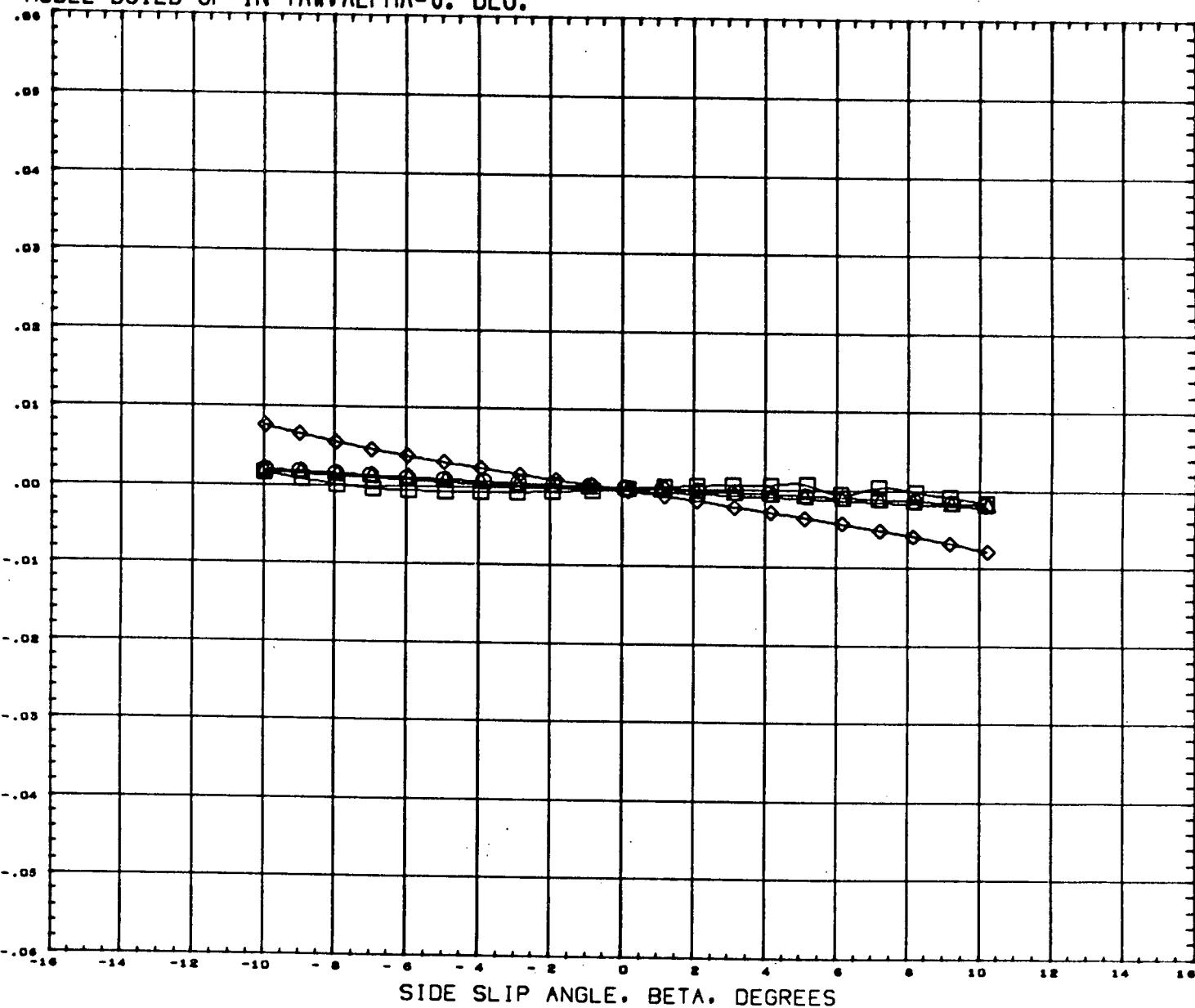
REFERENCE INFORMATION
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LREF 1.4660 INCHES
BREF 9.6580 INCHES
XMRP 7.6210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCENT

MACH 6.120

PAGE 91

MODEL BUILD-UP IN YAW, ALPHA=0. DEG.

ROLLING MOMENT COEFFICIENT. CBL (BODY AXIS)



SIDE SLIP ANGLE. BETA. DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX284) GAC HST-020 TBC H-32 BOOSTER B8
 (FCX294) GAC HST-020 TBC H-32 BOOSTER B8W4
 (FCX204) GAC HST-020 TBC H-32 BOOSTER B8W4V3
 (FCX224) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

ALPHA ELEVTR HTAIL

0.000 -15.000

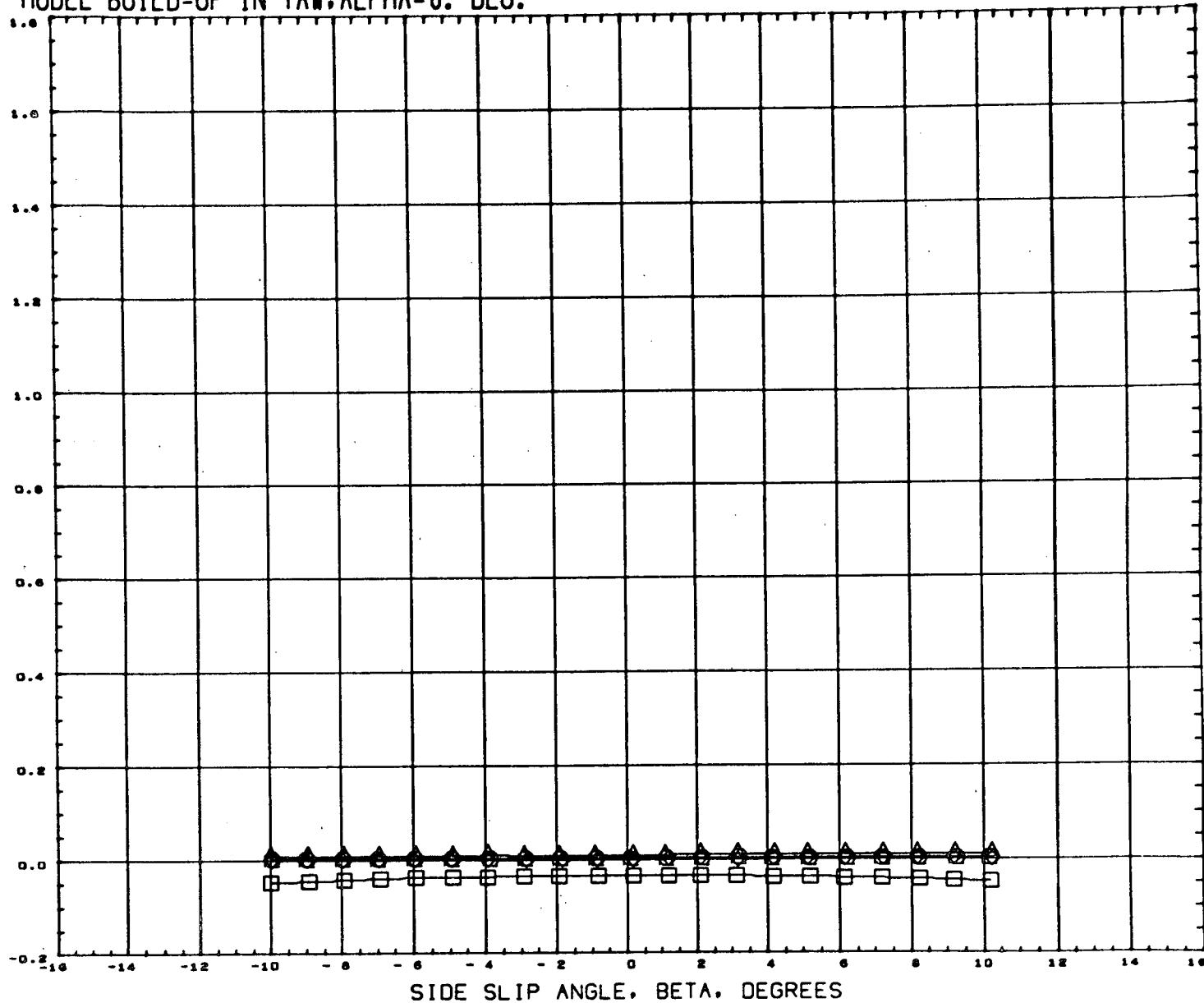
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XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5670	INCHES
SCALE	0.4348	PERCNT

MACH 0.120

MODEL BUILD-UP IN YAW, ALPHA=0, DEG.

LIFT COEFFICIENT, CL



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(FCX204)	GAC HST-020 TBC H-32 BOOSTER B8
(FCX294)	GAC HST-020 TBC H-32 BOOSTER B8W4
(FCX204)	GAC HST-020 TBC H-32 BOOSTER B8W4V3
(FCX224)	GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

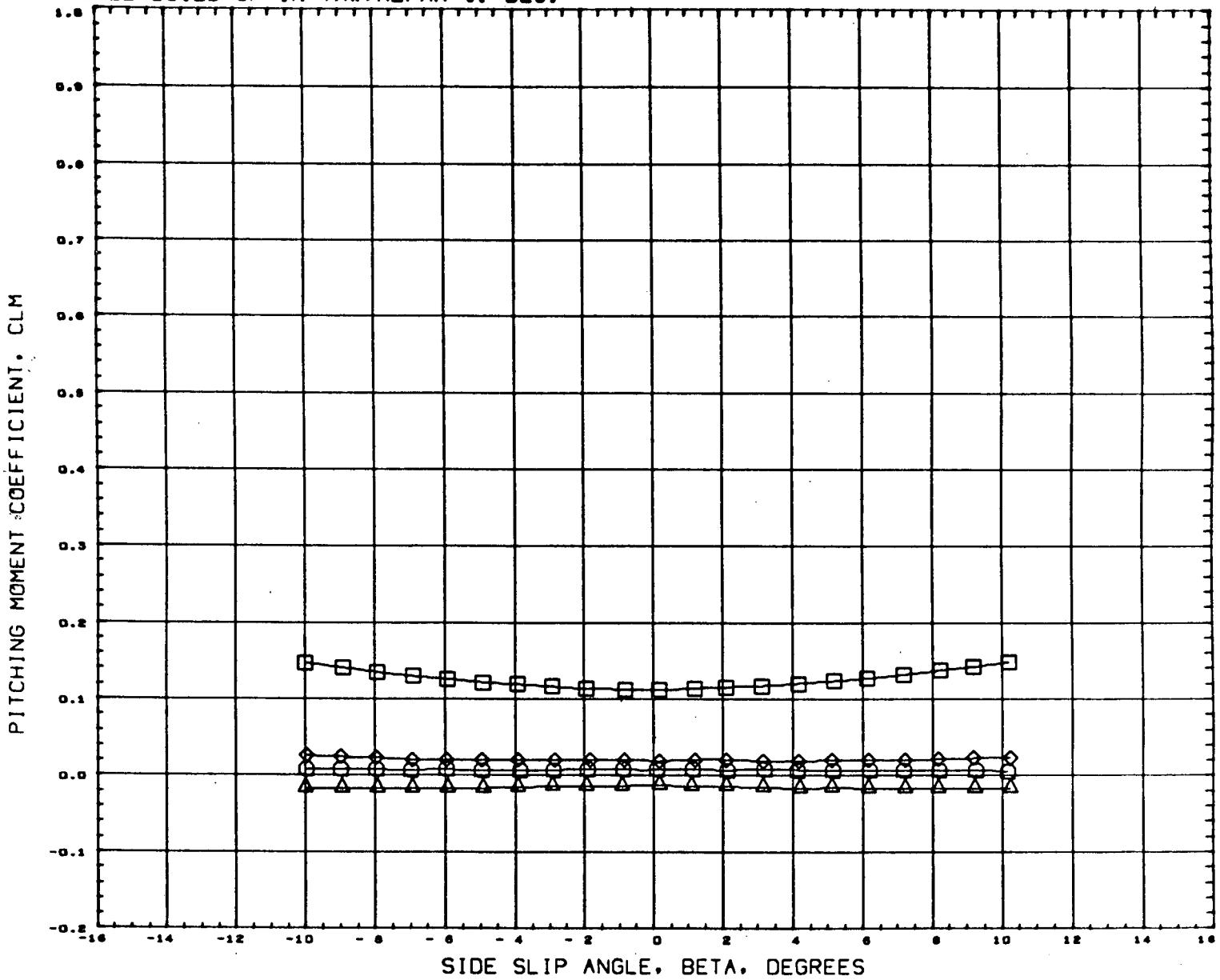
ALPHA	ELEVTR	HTAIL
0.000		
0.000		
0.000		
0.000	-15.000	

REFERENCE INFORMATION
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LREF 1.4680 INCHES
BREF 9.6520 INCHES
XMRP 7.8210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.5870 INCHES
SCALE 0.4348 PERCNT

MACH 0.120

PAGE 93

MODEL BUILD-UP IN YAW, ALPHA=0, DEG.

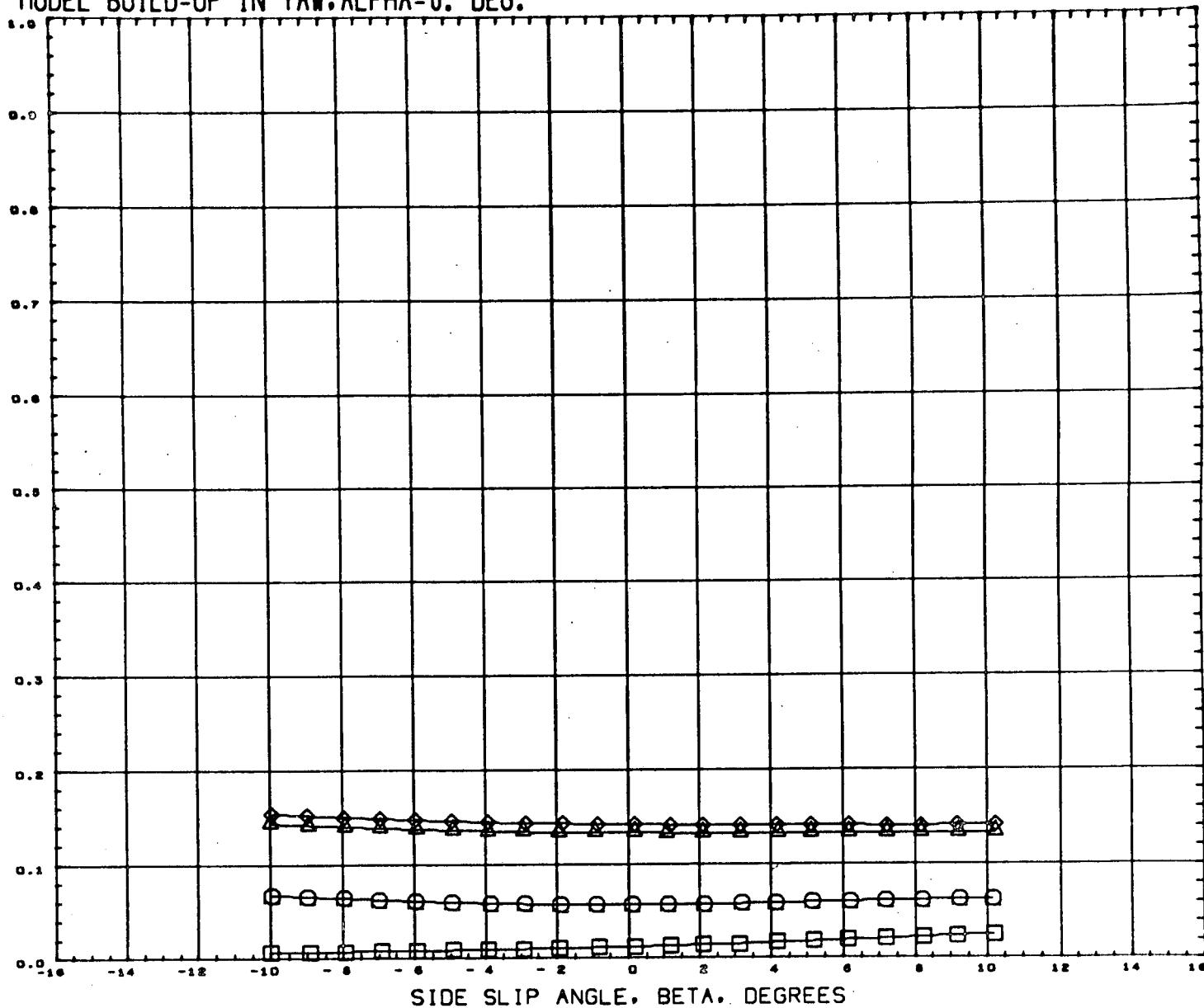


DATA SET SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	ELEVTR	MTAIL	REFERENCE INFORMATION
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(FCX294)	△	GAC HST-020	TBC H-32 BOOSTER	BBW4	0.000		LREF 1.4680 INCHES
(FCX204)	◇	GAC HST-020	TBC H-32 BOOSTER	BBW4V3	0.000		BREF 9.6520 INCHES
(FCX224)	□	GAC HST-020	TBC H-32 BOOSTER	BBW4H4V3	0.000	-15.000	XMRP 7.8210 INCHES
							YMRP 0.0000 INCHES
							ZMRP 1.5870 INCHES
							SCALE 0.4348 PERCNT

MACH 8.120

MODEL BUILD-UP IN YAW, ALPHA=0. DEG.

FOREBODY DRAG COEFFICIENT, CDF



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	B8	B8W4	B8W4V3	B8W4H4V3
(FCX284)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000	0.000
(FCX294)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000	0.000
(FCX204)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000	0.000
(FCX224)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000	0.000

ALPHA	ELEVTR	HTAIL
0.000	-15.000	

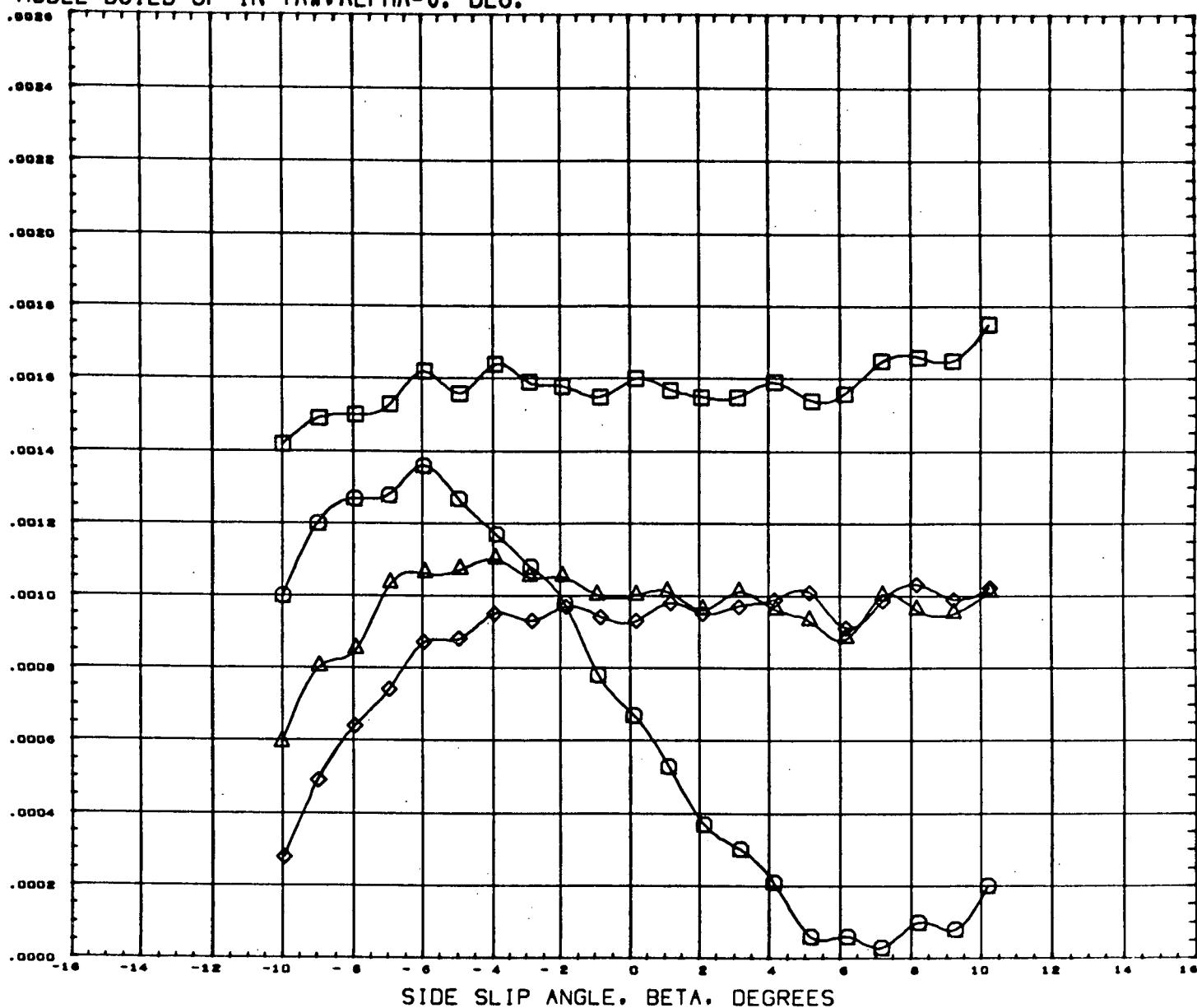
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LREF 1.4680 INCHES
BREF 9.6920 INCHES
XHRP 7.8210 INCHES
YHRP 0.0000 INCHES
ZHRP 1.3870 INCHES
SCALE 0.4348 PERCNT

MACH 8.120

PAGE 95

MODEL BUILD-UP IN YAW, ALPHA=0, DEG.

BASE DRAG COEFFICIENT, CD_B



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX284) GAC HST-020 TBC H-32 BOOSTER B8
 (FCX294) GAC HST-020 TBC H-32 BOOSTER B8W4
 (FCX204) GAC HST-020 TBC H-32 BOOSTER B8W4V3
 (FCX224) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3

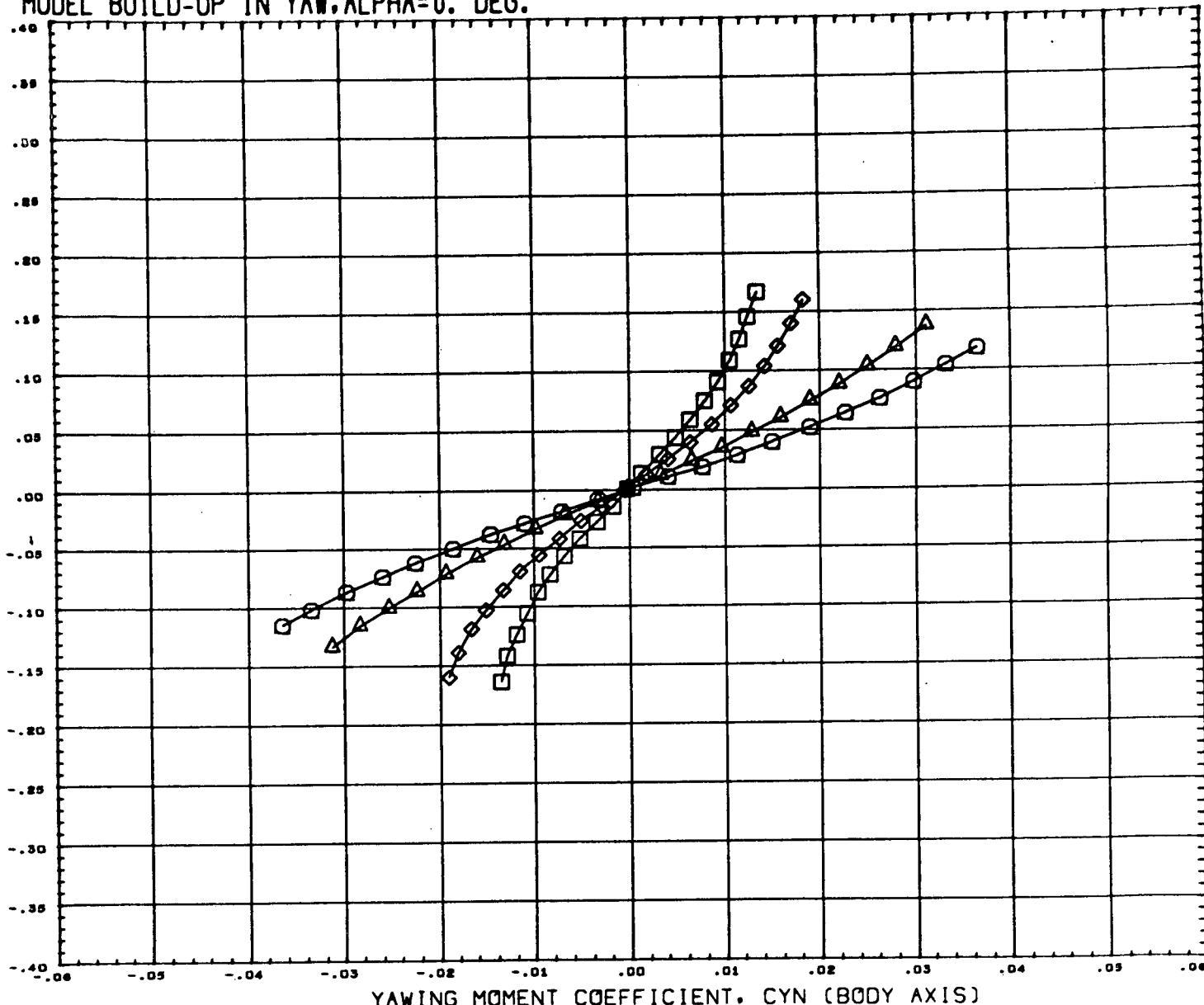
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 0.000 -15.000

REFERENCE INFORMATION
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 LREF 1.4680 INCHES
 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

MODEL BUILD-UP IN YAW, ALPHA=0. DEG.

LATERAL FORCE COEFFICIENT, CY



YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	B6	B6W4	B6W4V3	B6W4H4V3
(FCX284)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000	0.000
(FCX294)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000	0.000
(FCX2D4)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000	0.000
(FCX224)	GAC HST-020 TBC H-32 BOOSTER	0.000	0.000	0.000	0.000

ALPHA	ELEVTR	HTAIL
0.000	-15.000	0.000

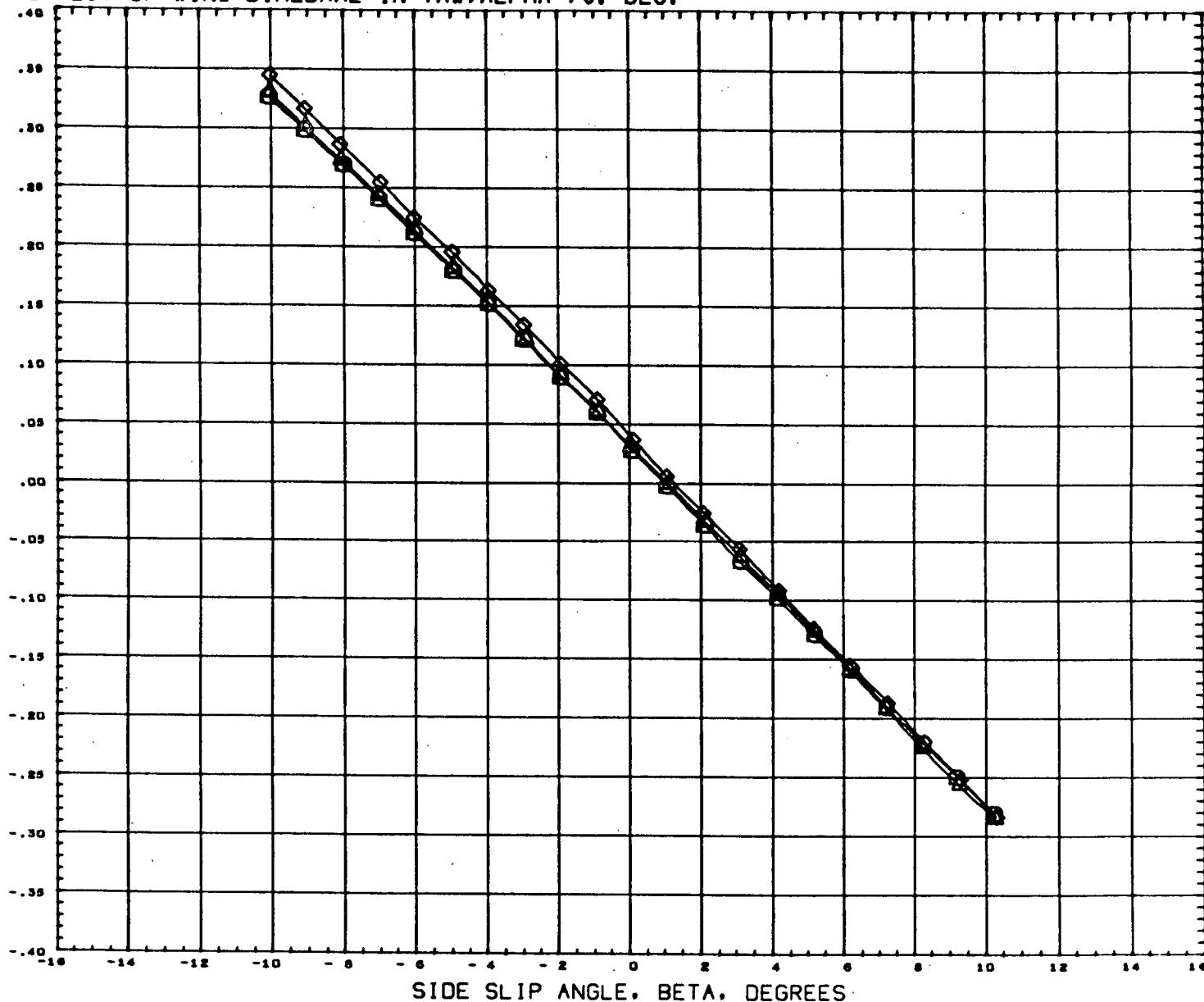
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LREF 1.4680 INCHES
BREF 9.6920 INCHES
XMRP 7.6210 INCHES
YMRP 0.0000 INCHES
ZMRP 1.3670 INCHES
SCALE 0.4348 PERCENT

MACH 8.120

PAGE 97

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=70. DEG.

LATERAL FORCE COEFFICIENT, CY



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX083) Q GAC HST-020 TBC H-32 BOOSTER B6W4H4
 (FCX143) A GAC HST-020 TBC H-32 BOOSTER B6W6H4
 (FCX153) D GAC HST-020 TBC H-32 BOOSTER B6W7H4

ALPHA ELEVTR HTAIL

70.000	0.000	-15.000
70.000	0.000	-15.000
70.000	0.000	-15.000

REFERENCE INFORMATION

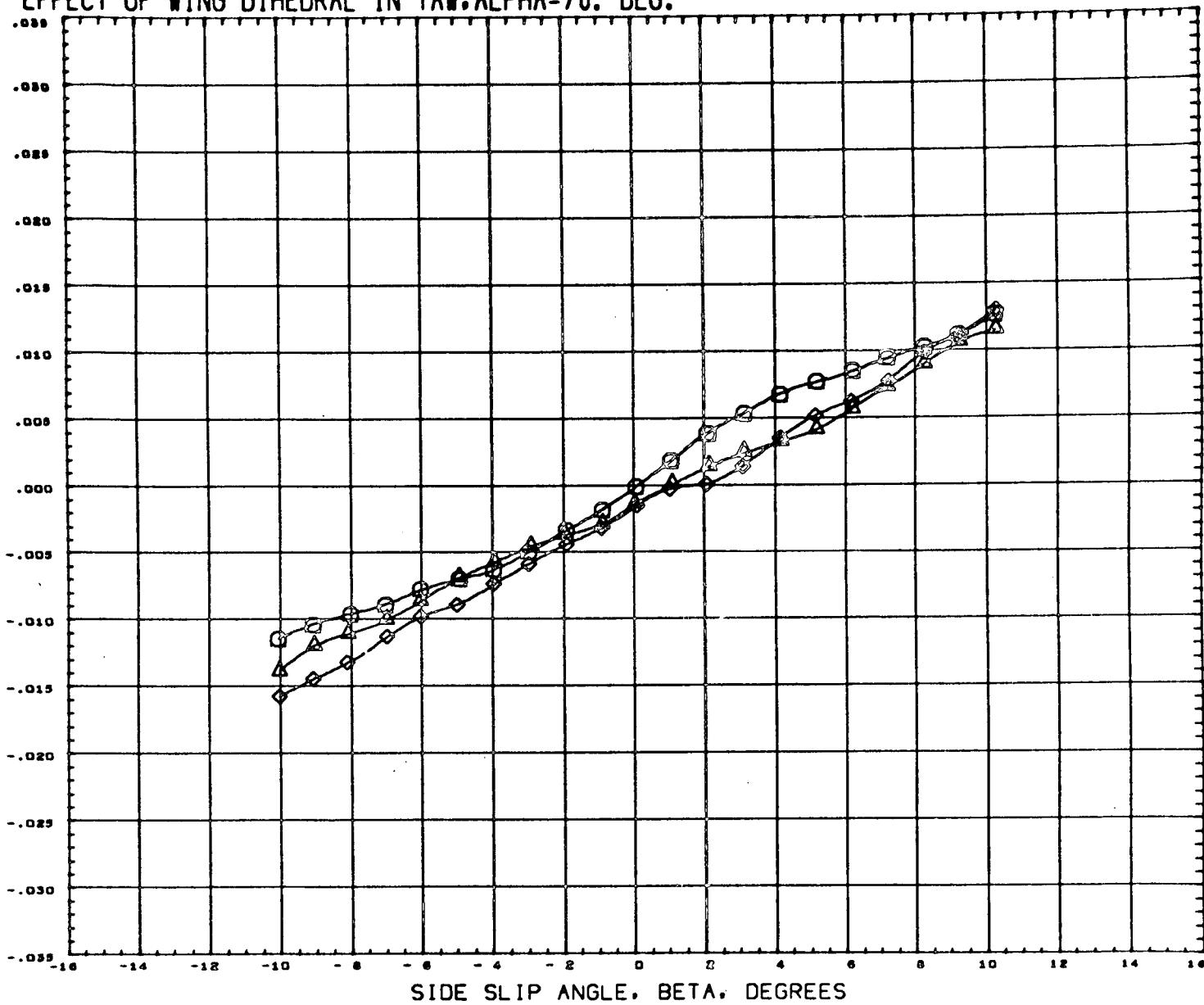
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LREF	1.4680	INCHES
BREF	9.6520	INCHES
XHRP	7.6210	INCHES
YHRP	0.0000	INCHES
ZHRP	1.5870	INCHES
SCALE	0.4348	PERCNT

MACH 0.120

PAGE 98

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=70. DEG.

YAWING MOMENT COEFFICIENT, CLN (STABILITY AXIS)



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX083) GAC HST-020 TBC H-32 BOOSTER
 (FCX143) GAC HST-020 TBC H-32 BOOSTER
 (FCX153) GAC HST-020 TBC H-32 BOOSTER

ALPHA ELEVTR MTAIL
 70.000 0.000 -15.000
 70.000 0.000 -15.000
 70.000 0.000 -15.000

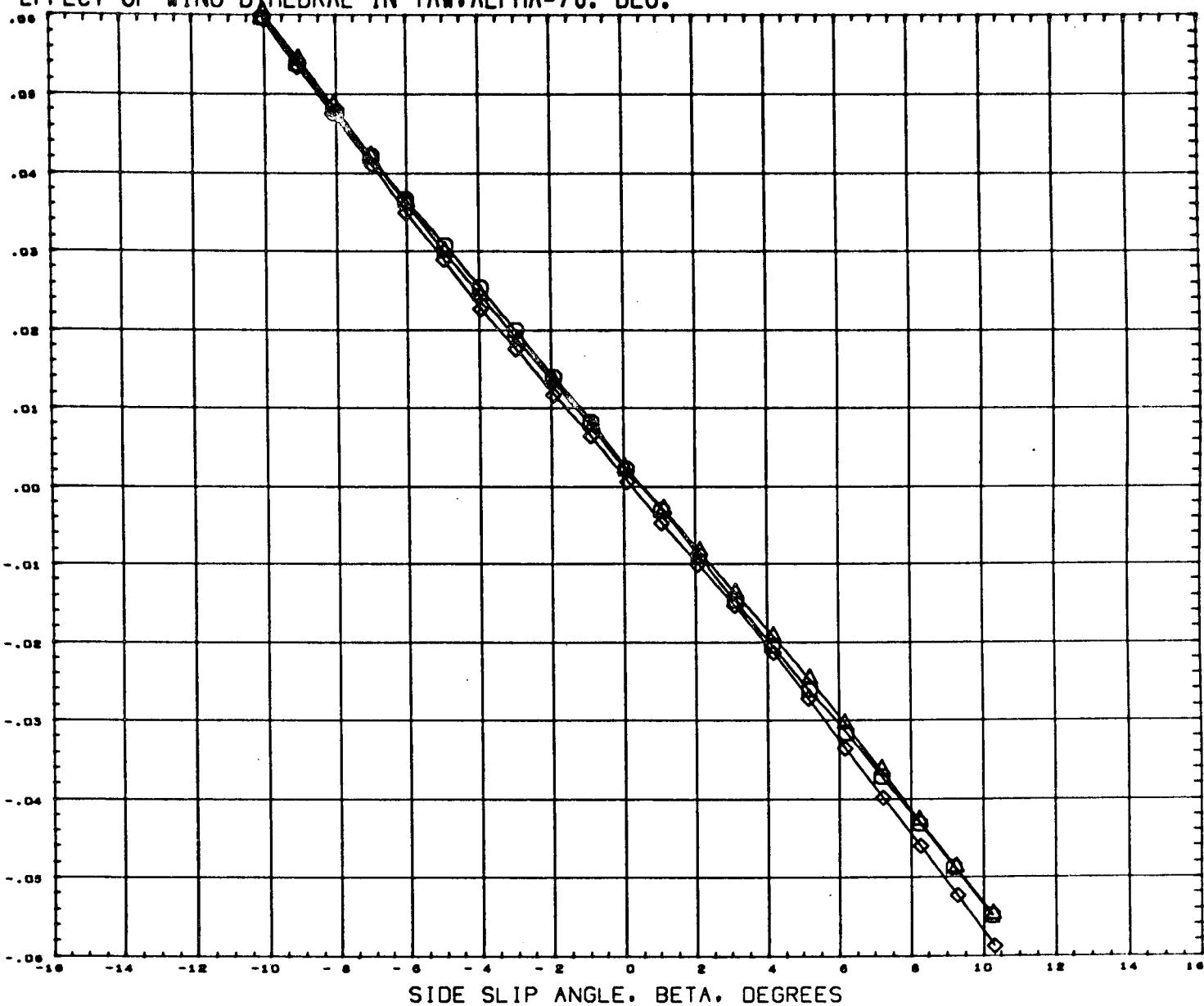
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 LREF 1.4680 INCHES
 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5670 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

PAGE 99

EFFECT OF WING DIHEDRAL IN YAW. ALPHA=70. DEG.

ROLLING MOMENT COEFFICIENT, CSL (STABILITY AXIS)



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX083) GAC HST-D2D TBC H-32 BOOSTER B6W4H4
(FCX143) GAC HST-D2D TBC H-32 BOOSTER B6W6H4
(FCX153) GAC HST-D2D TBC H-32 BOOSTER B6W7H4

ALPHA ELEVTR HTAIL

70.000 0.000 -15.000
70.000 0.000 -15.000
70.000 0.000 -15.000

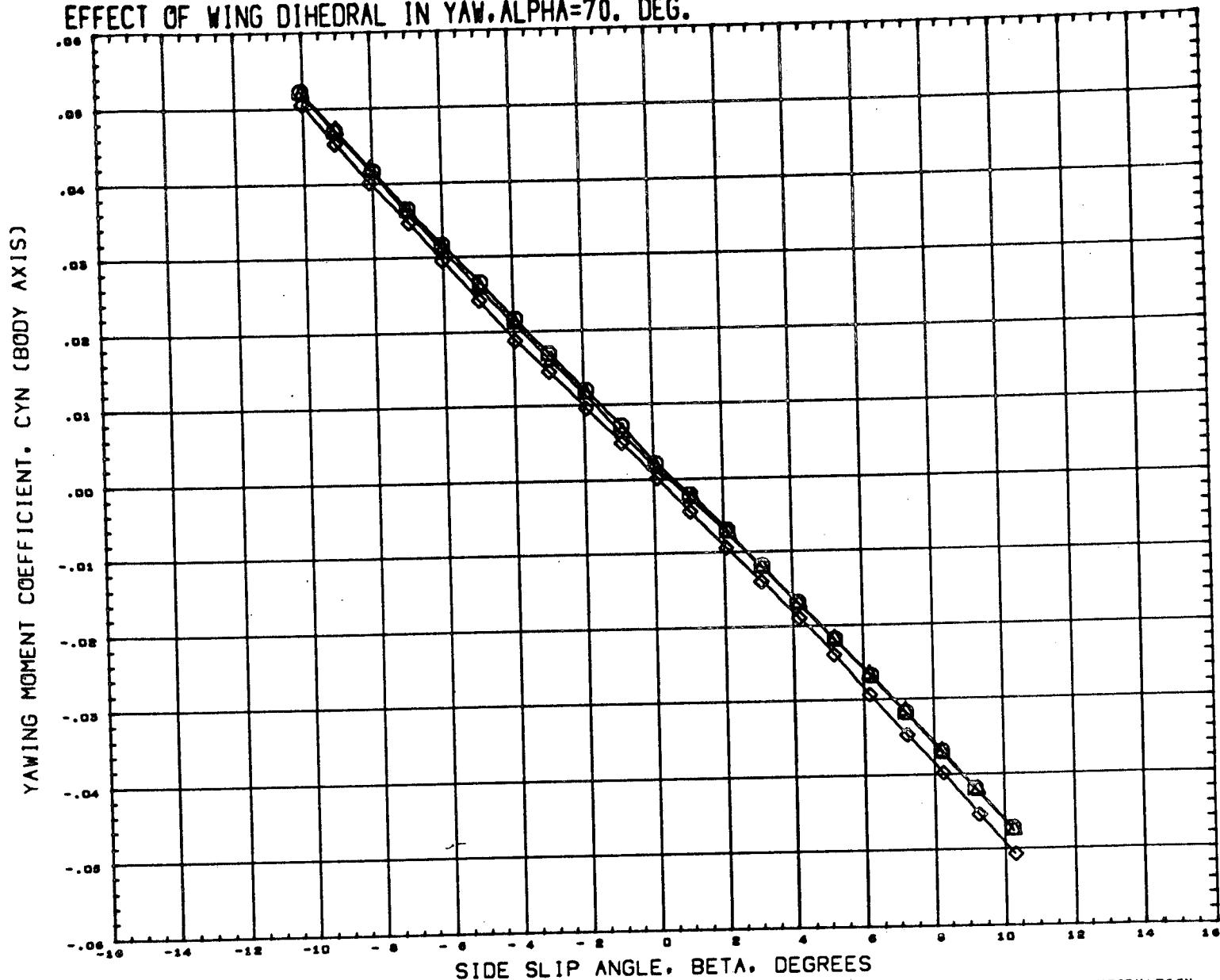
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BREF	9.6520	INCHES
XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4340	PERCNT

MACH 0.120

PAGE 100

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=70. DEG.



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX083) GAC HST-U2D TBC H-32 BOOSTER B6W4H4
 (FCX143) GAC HST-O2D TBC H-32 BOOSTER B6W6H4
 (FCX183) GAC HST-O2D TBC H-32 BOOSTER B6W7H4

ALPHA ELEVTR HTAIL

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70.000	0.000	-15.000
70.000	0.000	-15.000

REFERENCE INFORMATION

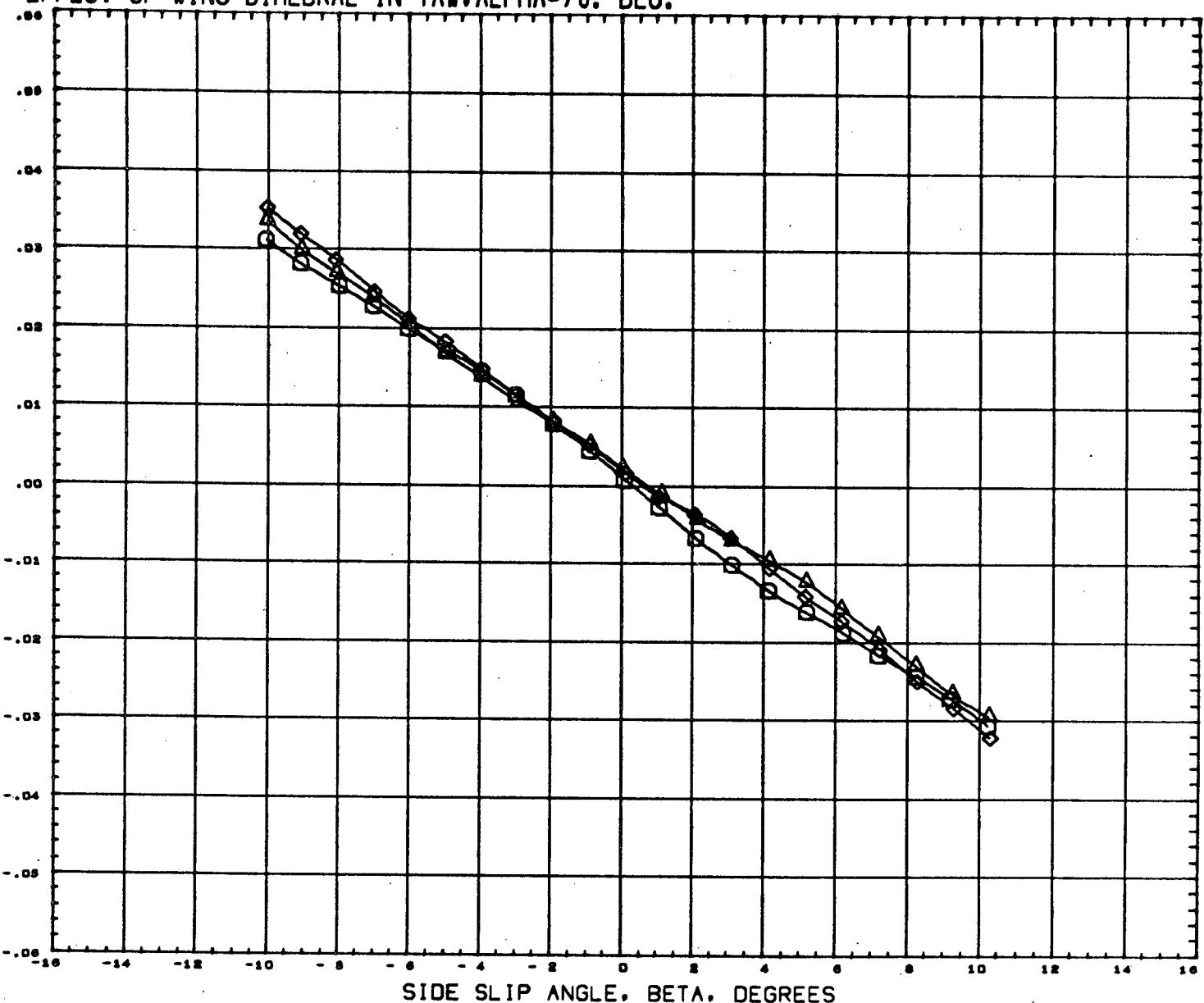
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LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4348	PERCNT

MACH 0.120

PAGE 101

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=70. DEG.

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX083) GAC HST-D20 TBC M-32 BOOSTER B6W4H4
 (FCX143) GAC HST-D20 TBC M-32 BOOSTER B6W6H4
 (FCX153) GAC HST-D20 TBC M-32 BOOSTER B6W7H4

ALPHA ELEVTR HTAIL

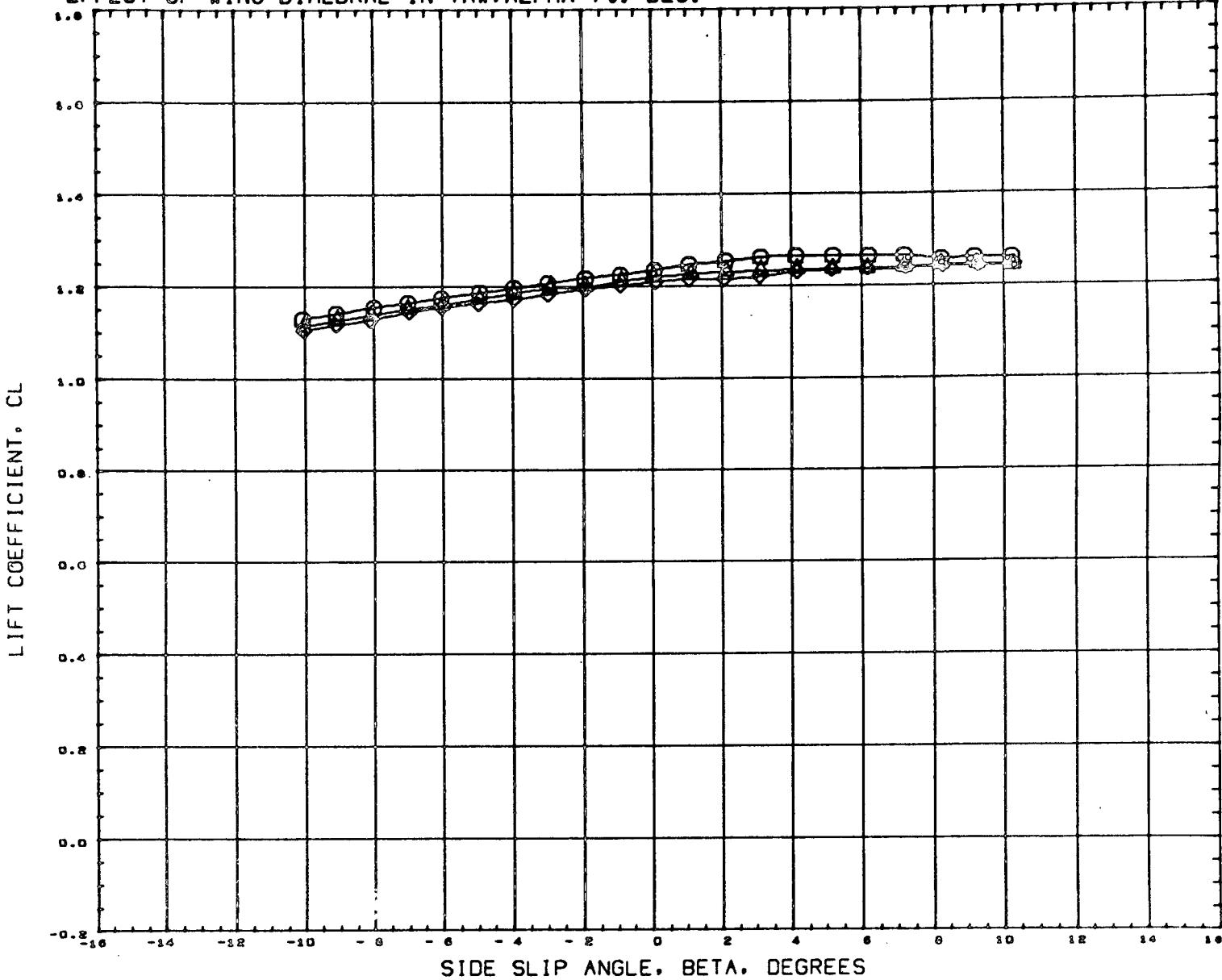
70.000 0.000 -15.000
 70.000 0.000 -15.000
 70.000 0.000 -15.000

REFERENCE INFORMATION

SREF	13.3440	INCHES
LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4348	PERCNT

MACH 0.120

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=70. DEG.



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX083) GAC HST-020 TBC H-32 BOOSTER B6W4H4
 (FCX143) GAC HST-020 TBC H-32 BOOSTER B6W6H4
 (FCX153) GAC HST-020 TBC H-32 BOOSTER B6W7H4

ALPHA ELEVTR HTAIL

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 70.000 0.000 -15.000
 70.000 0.000 -15.000

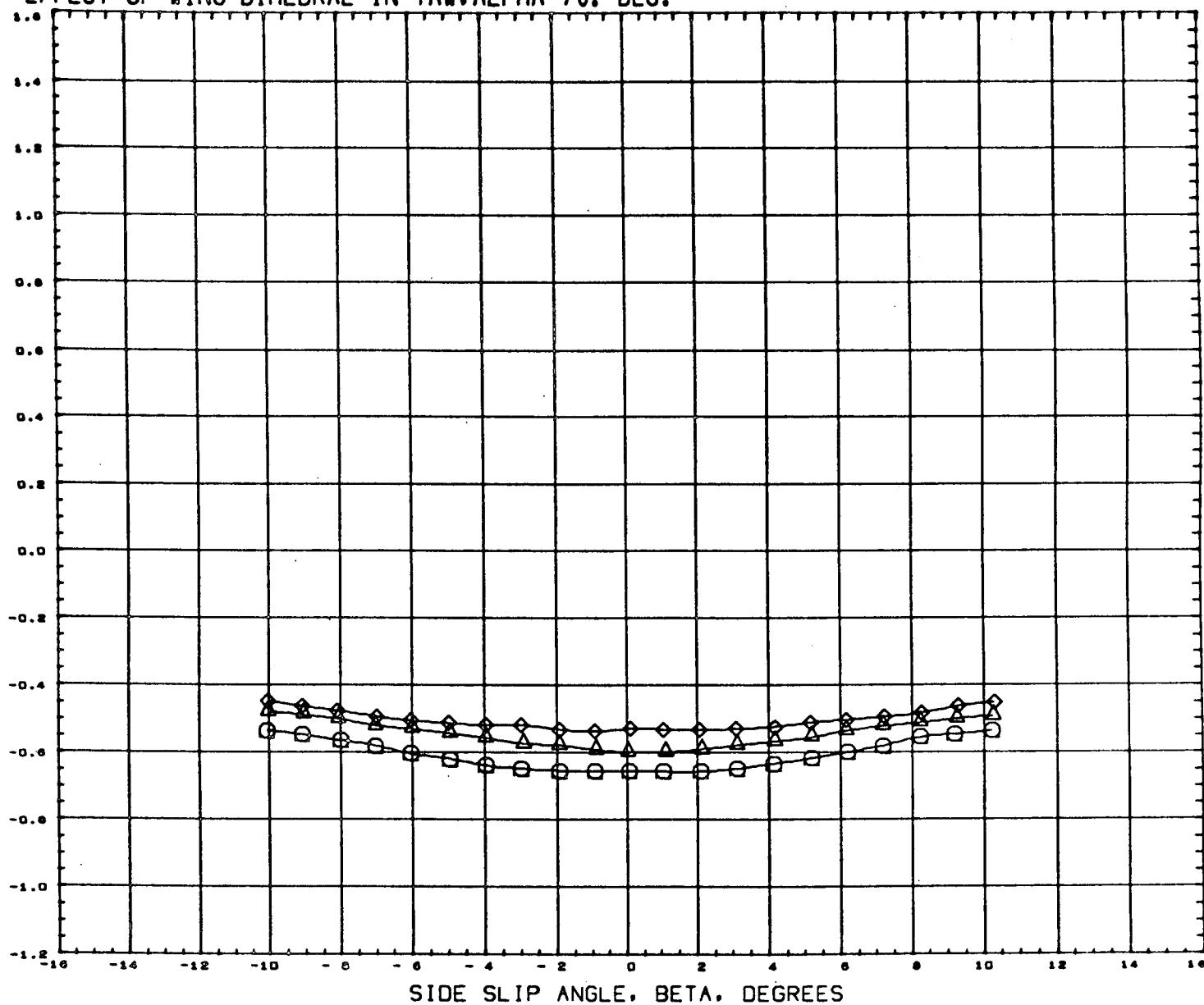
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 BREF 9.6520 INCHES
 XMRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4346 PERCNT

HACH 0.120

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=70. DEG.

PITCHING MOMENT COEFFICIENT, CLM



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX083) GAC HST-020 TBC H-32 BOOSTER
 (FCX143) GAC HST-020 TBC H-32 BOOSTER B6W4H4
 (FCX153) GAC HST-020 TBC H-32 BOOSTER B6W6H4

ALPHA ELEVTR HTAIL
 70.000 0.000 -15.000
 70.000 0.000 -15.000
 70.000 0.000 -15.000

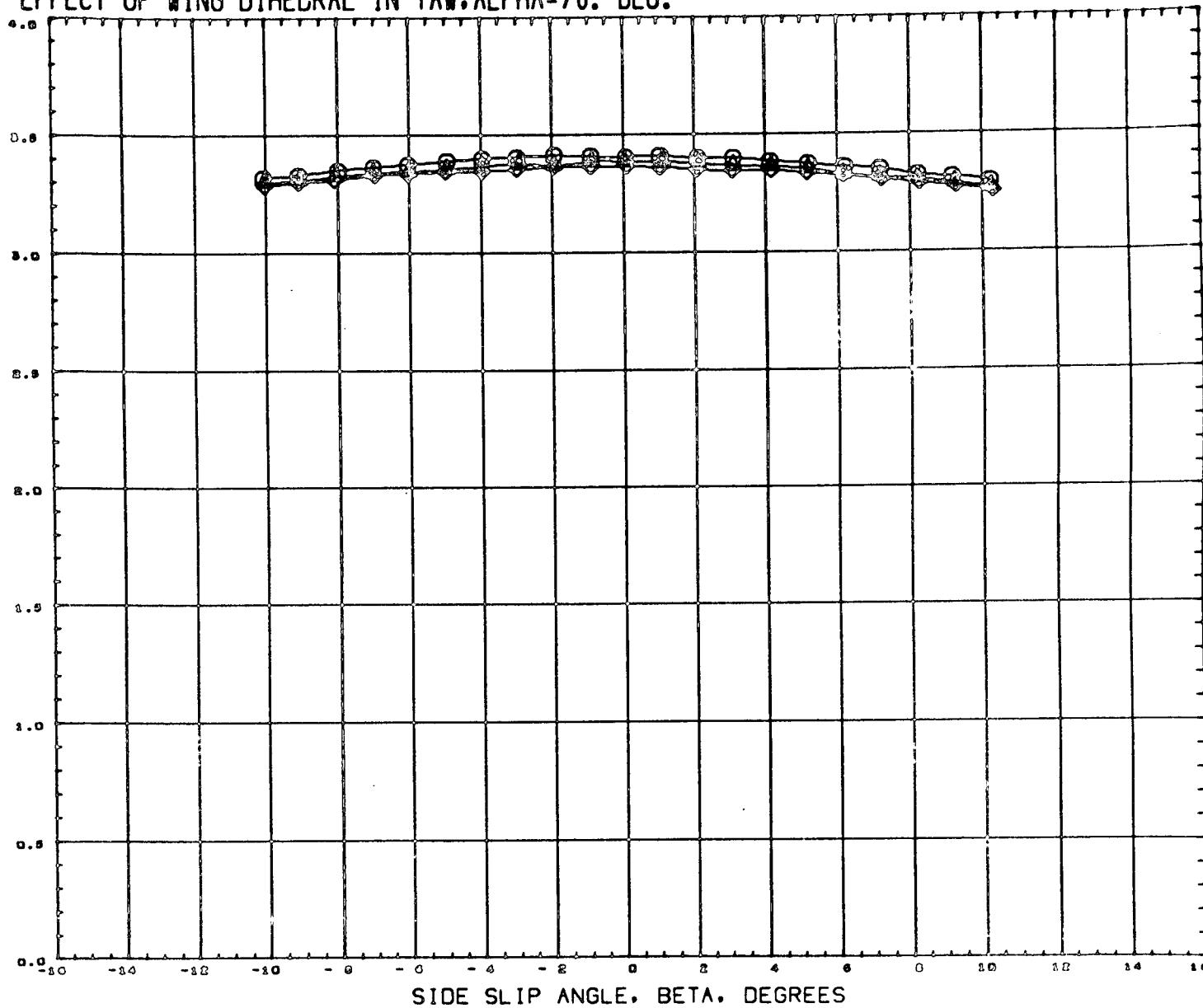
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 LREF 1.4680 INCHES
 BREF 9.6520 INCHES
 XMRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4346 PERCENT

MACH 0.120

PAGE 104

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=70. DEG.

FOREBODY DRAG COEFFICIENT. CDF



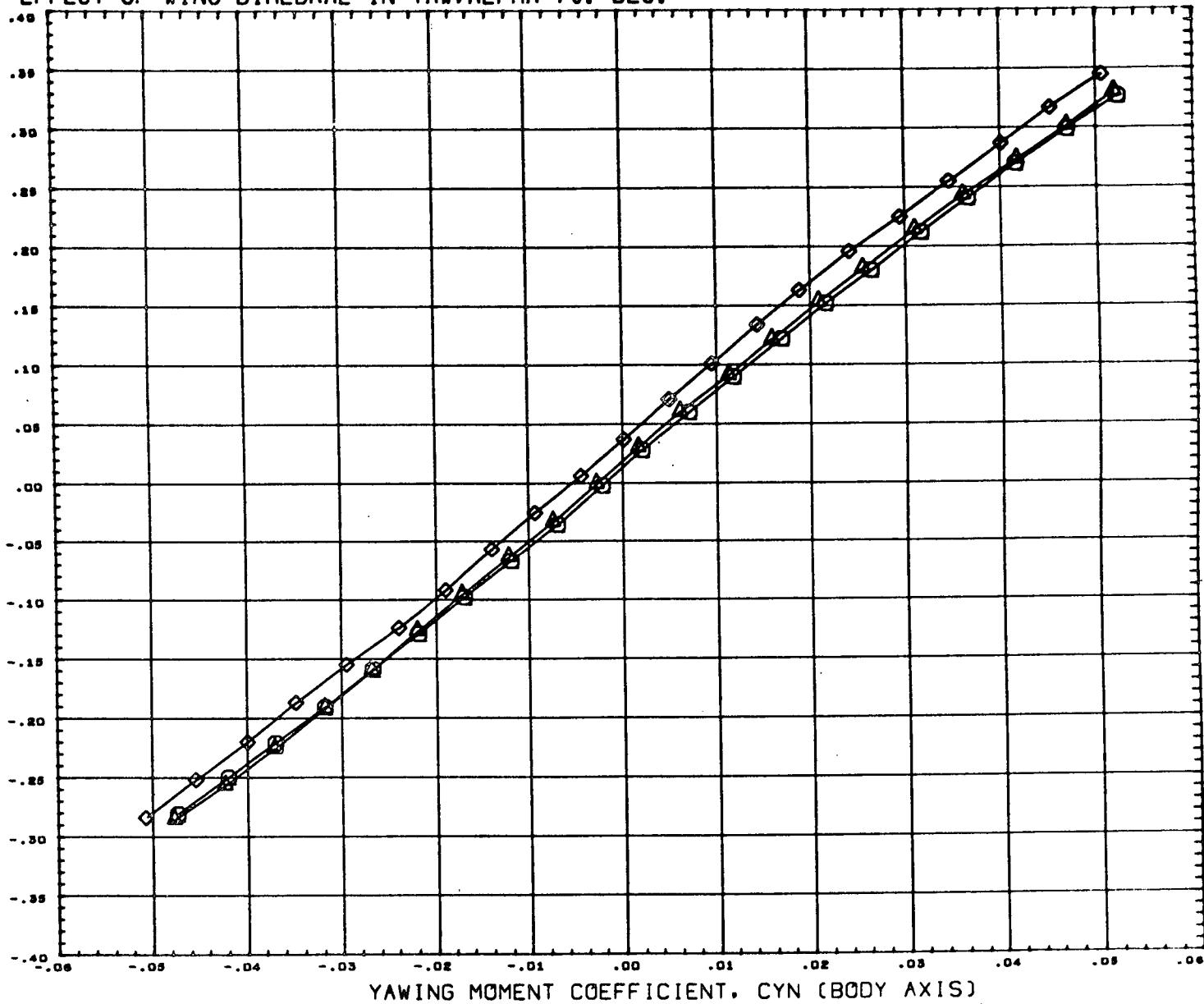
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELEVTR	HTAIL	REFERENCE INFORMATION
(FCX089)	GAC HST-020 TBC H-32 BOOSTER	70.000	0.000	-15.000	SREF 13.3440 SQ. IN.
(FCX143)	GAC HST-020 TBC H-32 BOOSTER	70.000	0.000	-15.000	LREF 1.4680 INCHES
(FCX153)	GAC HST-020 TBC H-32 BOOSTER	70.000	0.000	-15.000	BREF 9.6520 INCHES

MACH 0.820

PAGE 105

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=70. DEG.

LATERAL FORCE COEFFICIENT, CY



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX063) GAC HST-020 TBC H-32 BOOSTER B6W4H4
 (FCX143) GAC HST-020 TBC H-32 BOOSTER B6W6H4
 (FCX153) GAC HST-020 TBC H-32 BOOSTER B6W7H4

ALPHA ELEVTR MTAIL

70.000 0.000 -15.000
 70.000 0.000 -15.000
 70.000 0.000 -15.000

REFERENCE INFORMATION

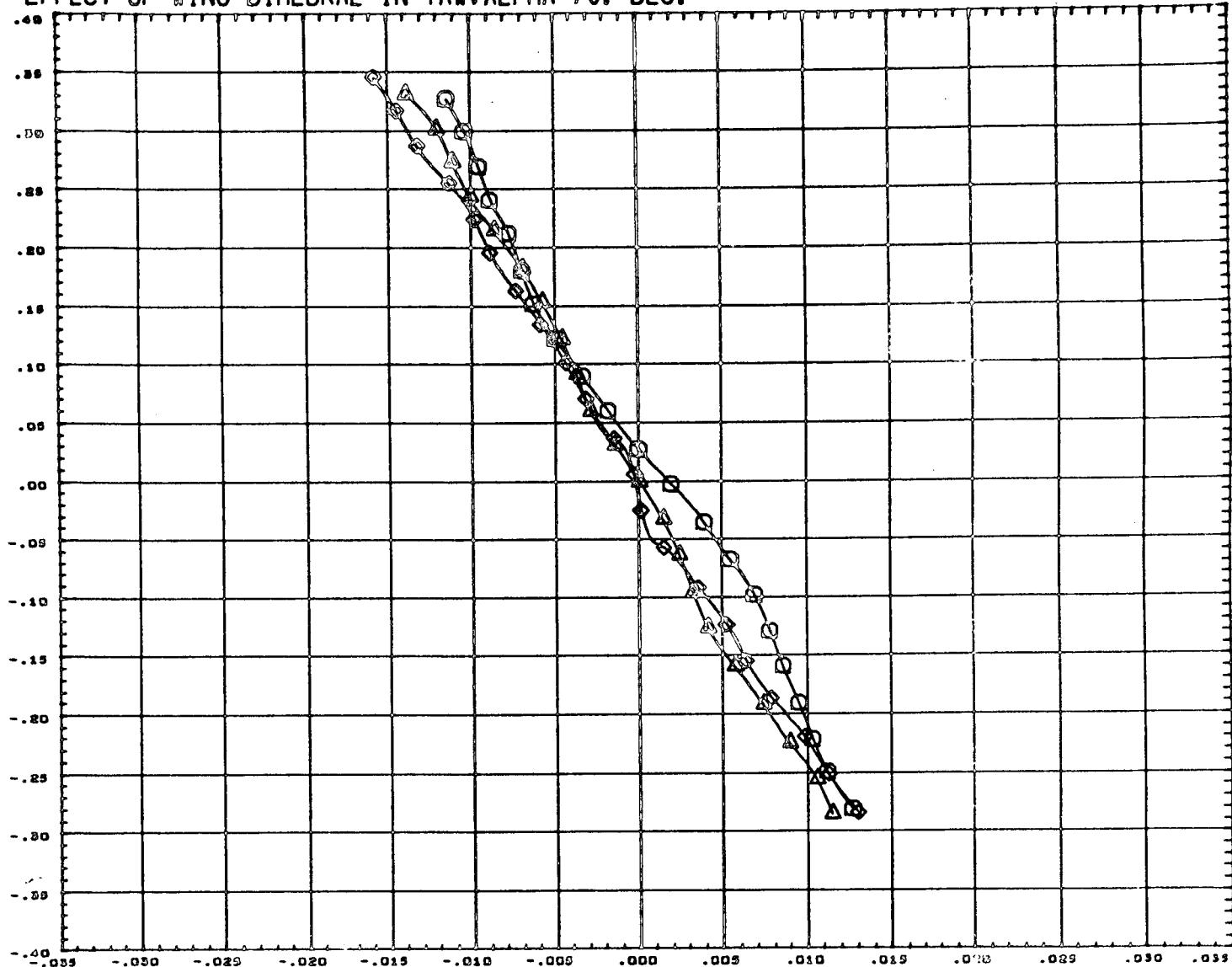
SREF 13.3440 SQ. IN.
 LREF 1.4680 INCHES
 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4346 PERCNT

MACH 0.120

PAGE 106

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=70. DEG.

LATERAL FORCE COEFFICIENT. CY



YAWING MOMENT COEFFICIENT. CLN (STABILITY AXIS)

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	B6W4H4	B6W6H4	B6W7H4
(FCX083)	GAC HST-020 TBC H-32 BOOSTER	70.000	0.000	-15.000
(FCX143)	GAC HST-020 TBC H-32 BOOSTER	70.000	0.000	-15.000
(FCX153)	GAC HST-020 TBC H-32 BOOSTER	70.000	0.000	-15.000

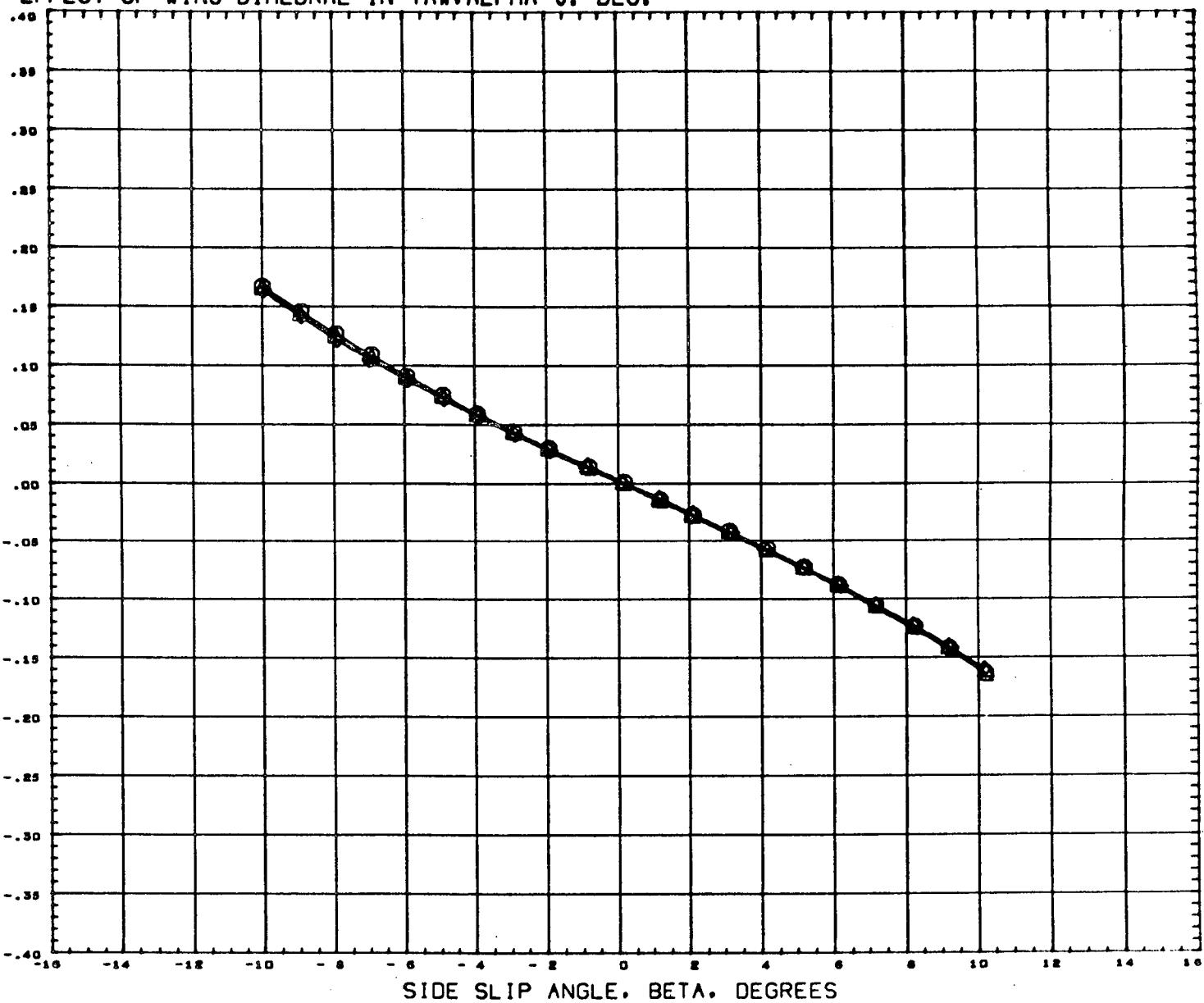
ALPHA	ELEVTR	MTAIL
70.000	0.000	-15.000
70.000	0.000	-15.000
70.000	0.000	-15.000

REFERENCE INFORMATION
SREF 13.3440 SQ. IN.
LREF 1.4680 INCHES
BREF 0.6520 INCHES
XHRP 7.6210 INCHES
YHRP 0.0000 INCHES
ZHRP 1.5870 INCHES
SCALE 0.4348 PERCENT

MACH 0.120

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=0, DEG.

LATERAL FORCE COEFFICIENT, CY



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX224) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX374) GAC HST-020 TBC H-32 BOOSTER B8W6H4V3
 (FCX384) GAC HST-020 TBC H-32 BOOSTER B8W7H4V3

ALPHA ELEVTR HTAIL

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 0.000 0.000 -15.000
 0.000 0.000 -15.000

REFERENCE INFORMATION

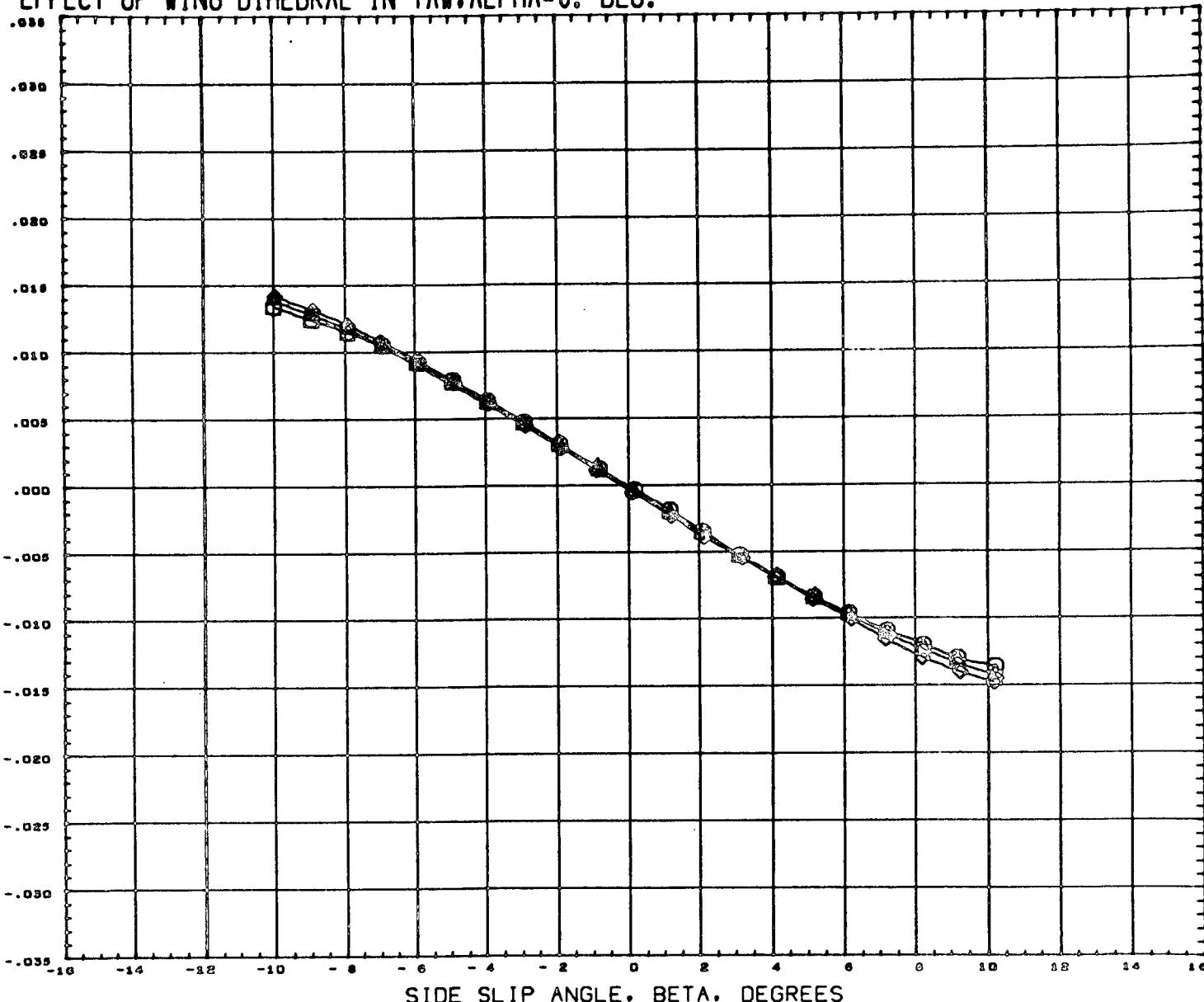
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LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.6210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5670	INCHES
SCALE	0.4348	PERCNT

MACH 8.120

PAGE 108

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=0, DEG.

YAWING MOMENT COEFFICIENT, CLN (STABILITY AXIS)



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX224) GAC HST-020 TBC H-32 BOOSTER
 (FCX374) GAC HST-020 TBC H-32 BOOSTER
 (FCX384) GAC HST-020 TBC H-32 BOOSTER

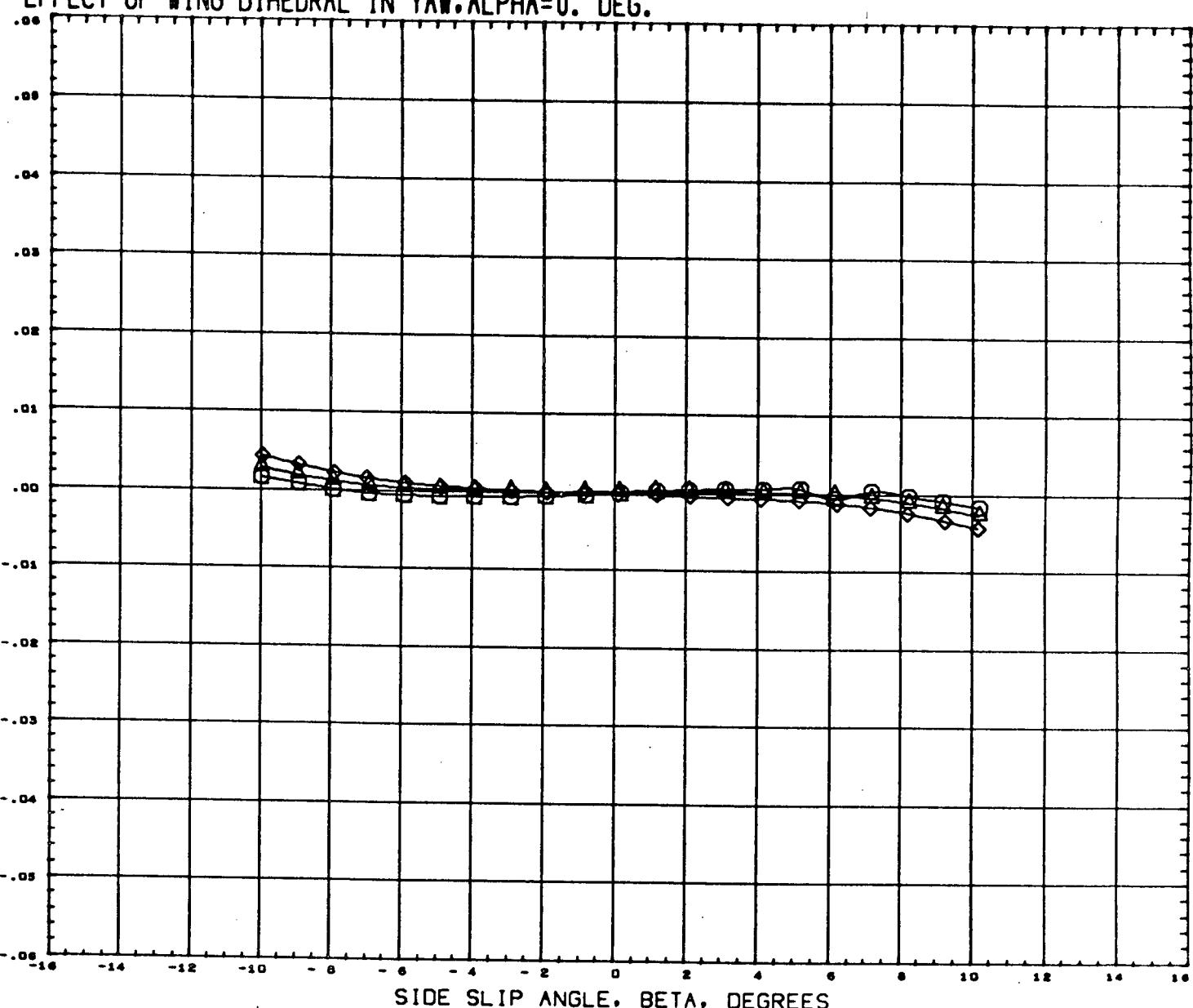
ALPHA ELEVTR HTAIL
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 0.000 0.000 -15.000

REFERENCE INFORMATION
 SREF 13.3440 SQ.IN.
 LREF 1.4680 INCHES
 BREF 9.6520 INCHES
 XMNP 7.6210 INCHES
 YMNP 0.0000 INCHES
 ZMNP 1.5970 INCHES
 SCALE 0.4348 PERCNT

MACH 0.120

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=0. DEG.

ROLLING MOMENT COEFFICIENT, CSL (STABILITY AXIS)



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX224) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX374) GAC HST-020 TBC H-32 BOOSTER B8W6H4V3
 (FCX384) GAC HST-020 TBC H-32 BOOSTER B8W7H4V3

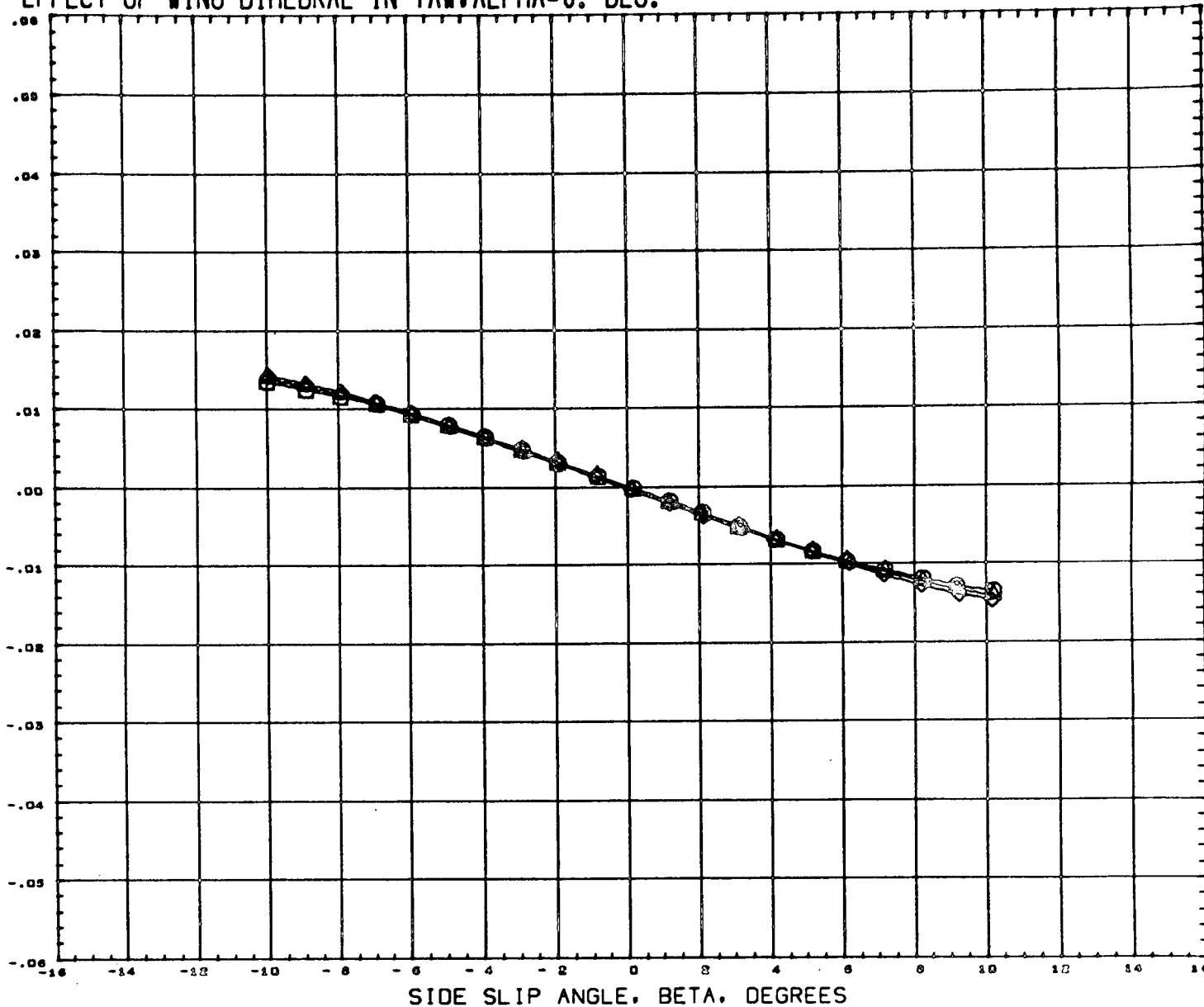
ALPHA ELEVTR HTAIL
 0.000 -15.000
 0.000 0.000 -15.000
 0.000 0.000 -15.000

REFERENCE INFORMATION
 SREF 13.3440 SQ.IN.
 LREF 1.4680 INCHES
 BREF 9.6920 INCHES
 XMRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

EFFECT OF WING DIHEDRAL IN YAW. ALPHA=0. DEG.

YAWING MOMENT COEFFICIENT. CYN (BODY AXIS)



SIDE SLIP ANGLE. BETA. DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX224) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX374) GAC HST-020 TBC H-32 BOOSTER B8W6H4V3
 (FCX384) GAC HST-020 TBC H-32 BOOSTER B8W7H4V3

ALPHA ELEVTR MTAIL

0.000 0.000 -15.000
 0.000 0.000 -15.000

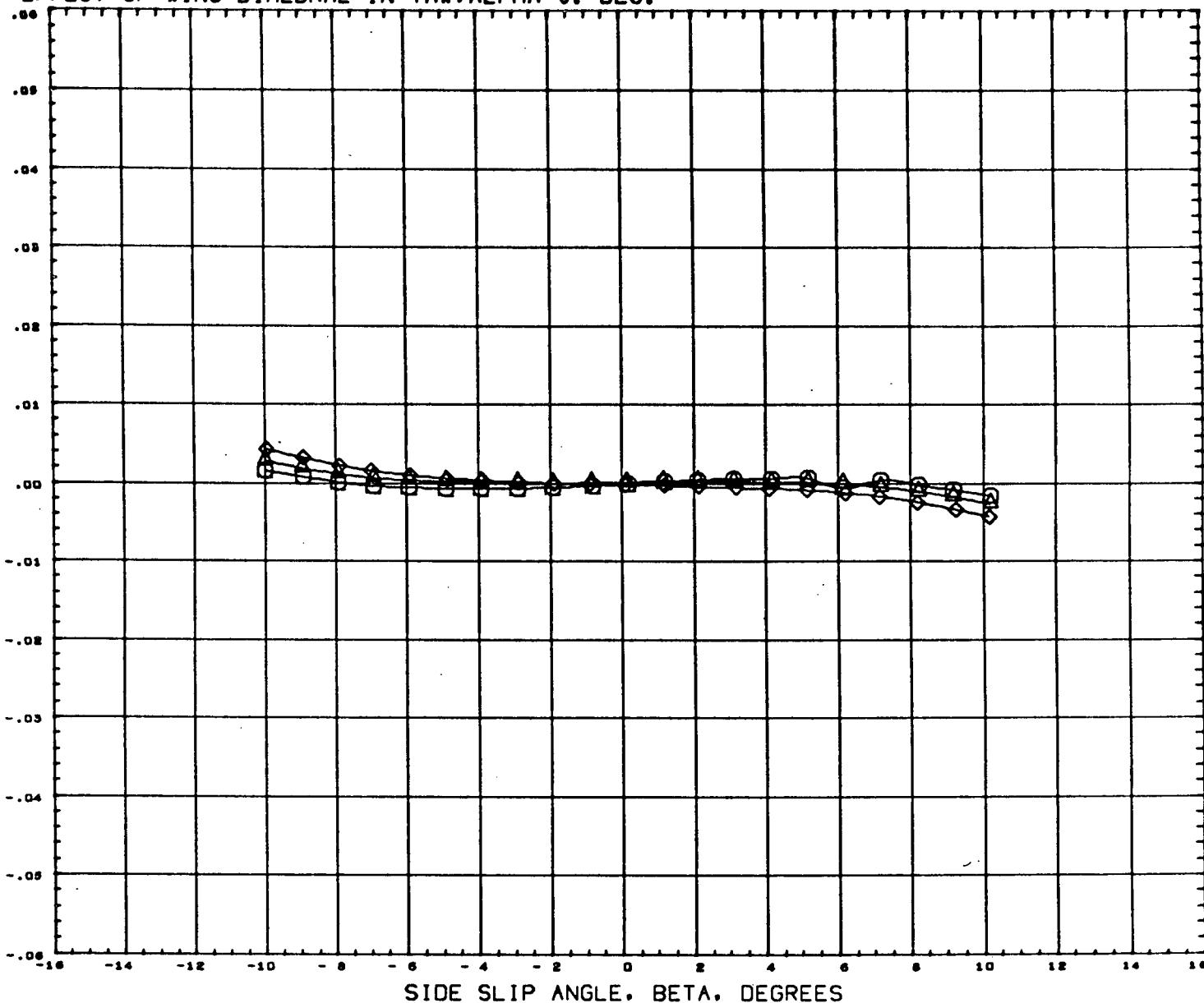
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 BREF 9.6520 INCHES
 XMRP 7.8810 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4340 PERCNT

MACH 0.120

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=0. DEG.

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(FCX224) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX374) GAC HST-020 TBC H-32 BOOSTER B8W6H4V3
 (FCX364) GAC HST-020 TBC H-32 BOOSTER B8W7H4V3

ALPHA ELEVTR HTAIL

0.000 0.000 -15.000

0.000 0.000 -15.000

0.000 0.000 -15.000

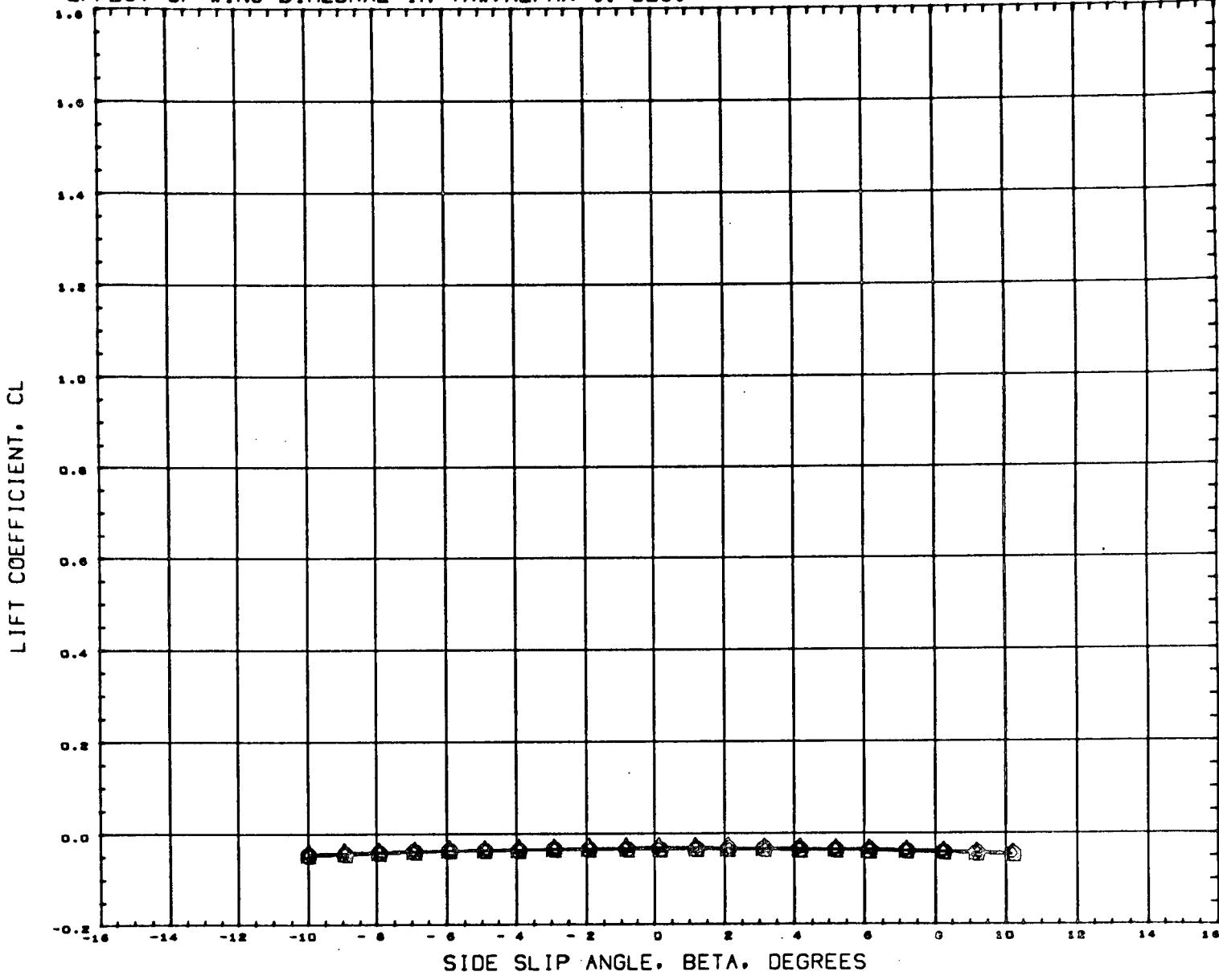
REFERENCE INFORMATION

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 BREF 9.6520 INCHES
 XMRP 7.8210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 6.120

PAGE 112

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=0. DEG.



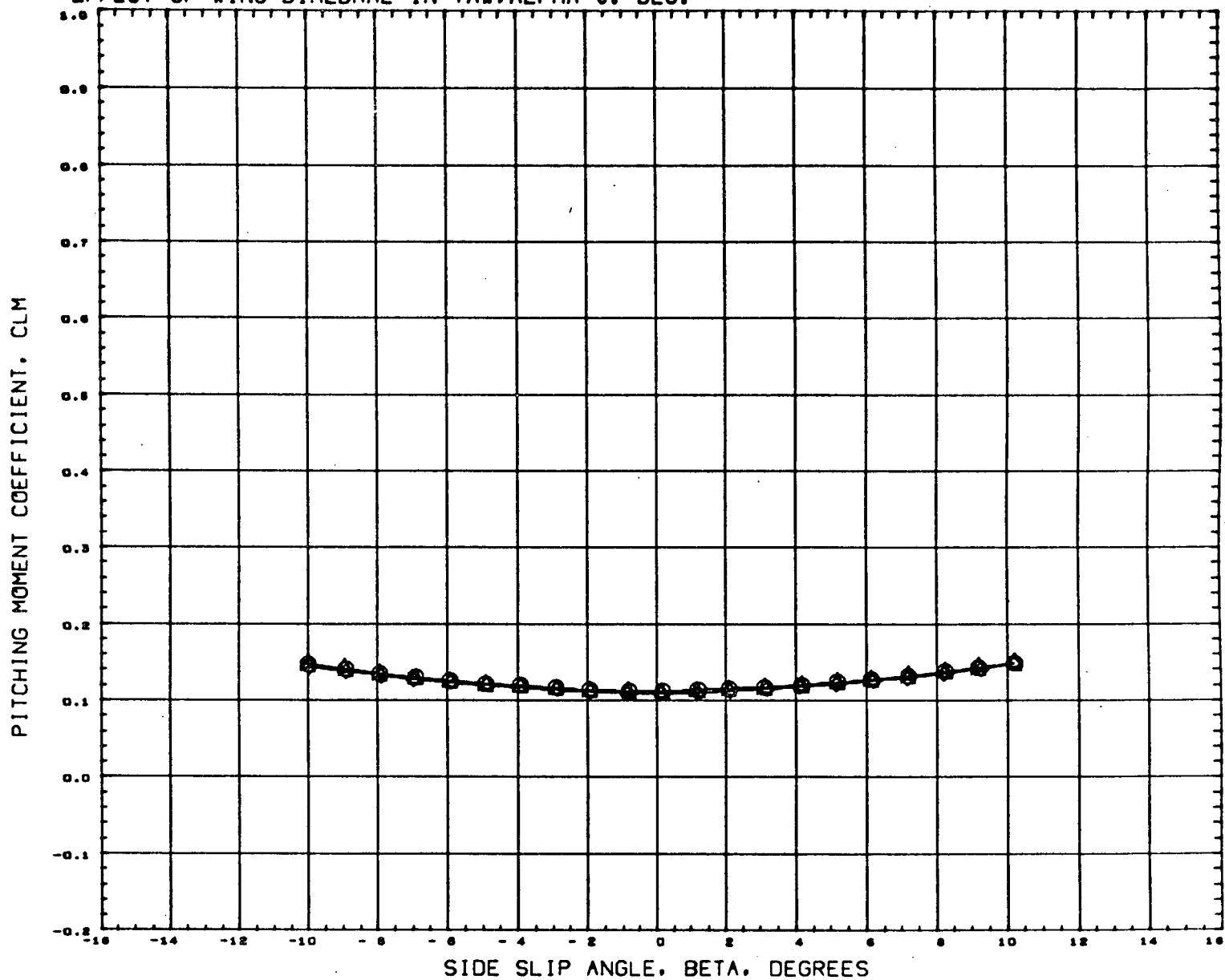
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 (FCX374) L GAC HST-D2D TBC H-32 BOOSTER 88W6H4V3
 (FCX364) D GAC HST-D2D TBC H-32 BOOSTER 88W7H4V3

ALPHA ELEVTR HTAIL
 0.000 0.000 -15.000
 0.000 0.000 -15.000

REFERENCE INFORMATION		
SREF	13.3440	SQ. IN.
LREF	1.4680	INCHES
BREF	9.6520	INCHES
XMRP	7.8210	INCHES
YMRP	0.0000	INCHES
ZMRP	1.5870	INCHES
SCALE	0.4348	PERCENT

MACH 0.120

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=0. DEG.

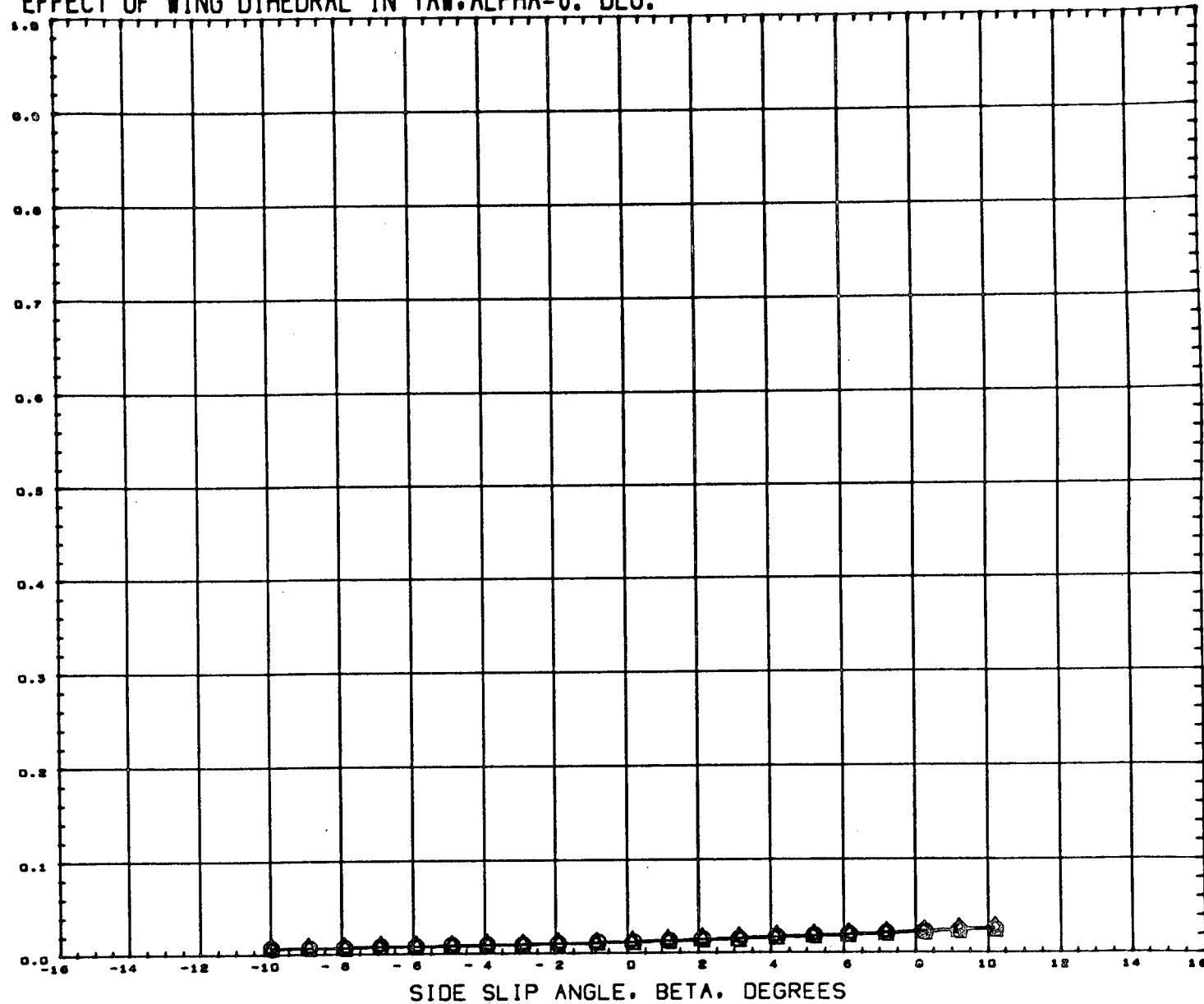


DATA SET SYMBOL CONFIGURATION DESCRIPTION				ALPHA	ELEVTR	HTAIL	REFERENCE INFORMATION		
(FCX224)	○	GAC HST-020	TBC H-32 BOOSTER	BBW4H4V3	0.000	0.000	-15.000	SREF	13.3440
(FCX374)	○	GAC HST-020	TBC H-32 BOOSTER	BBW6H4V3	0.000	0.000	-15.000	LREF	1.4680
(FCX384)	○	GAC HST-020	TBC H-32 BOOSTER	BBW7H4V3	0.000	0.000	-15.000	BREF	9.6520
							XMRP	7.6210	INCHES
							YMRP	0.0000	INCHES
							ZMRP	1.5870	INCHES
							SCALE	0.4348	PERCNT

MACH 0.120

EFFECT OF WING DIHEDRAL IN YAW. ALPHA=0. DEG.

FOREBODY DRAG COEFFICIENT, CDF



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX224) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX374) GAC HST-020 TBC H-32 BOOSTER B8W6H4V3
 (FCX384) GAC HST-020 TBC H-32 BOOSTER B8W7H4V3

ALPHA ELEVTR HTAIL
 0.000 0.000 -15.000
 0.000 0.000 -15.000
 0.000 0.000 -15.000

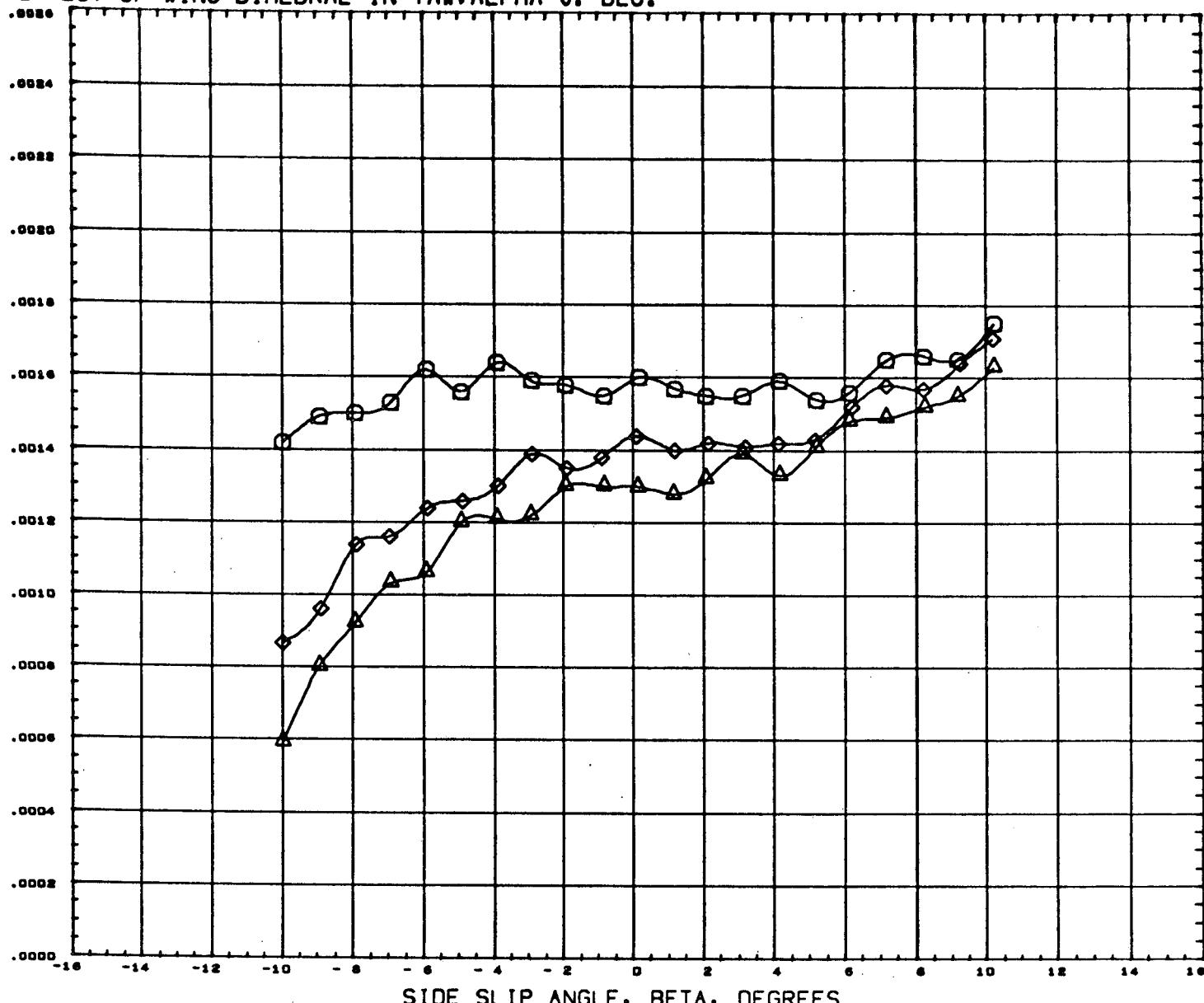
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 BREF 9.6520 INCHES
 XHREF 7.8210 INCHES
 YHREF 0.0000 INCHES
 ZHREF 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

PAGE 115

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=0. DEG.

BASE DRAG COEFFICIENT, CD_B



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (FCX224) GAC HST-020 TBC H-32 BOOSTER B8W4H4V3
 (FCX374) GAC HST-020 TBC H-32 BOOSTER B8W6H4V3
 (FCX384) GAC HST-020 TBC H-32 BOOSTER B8W7H4V3

ALPHA ELEVTR HTAIL
 0.000 0.000 -15.000
 0.000 0.000 -15.000
 0.000 0.000 -15.000

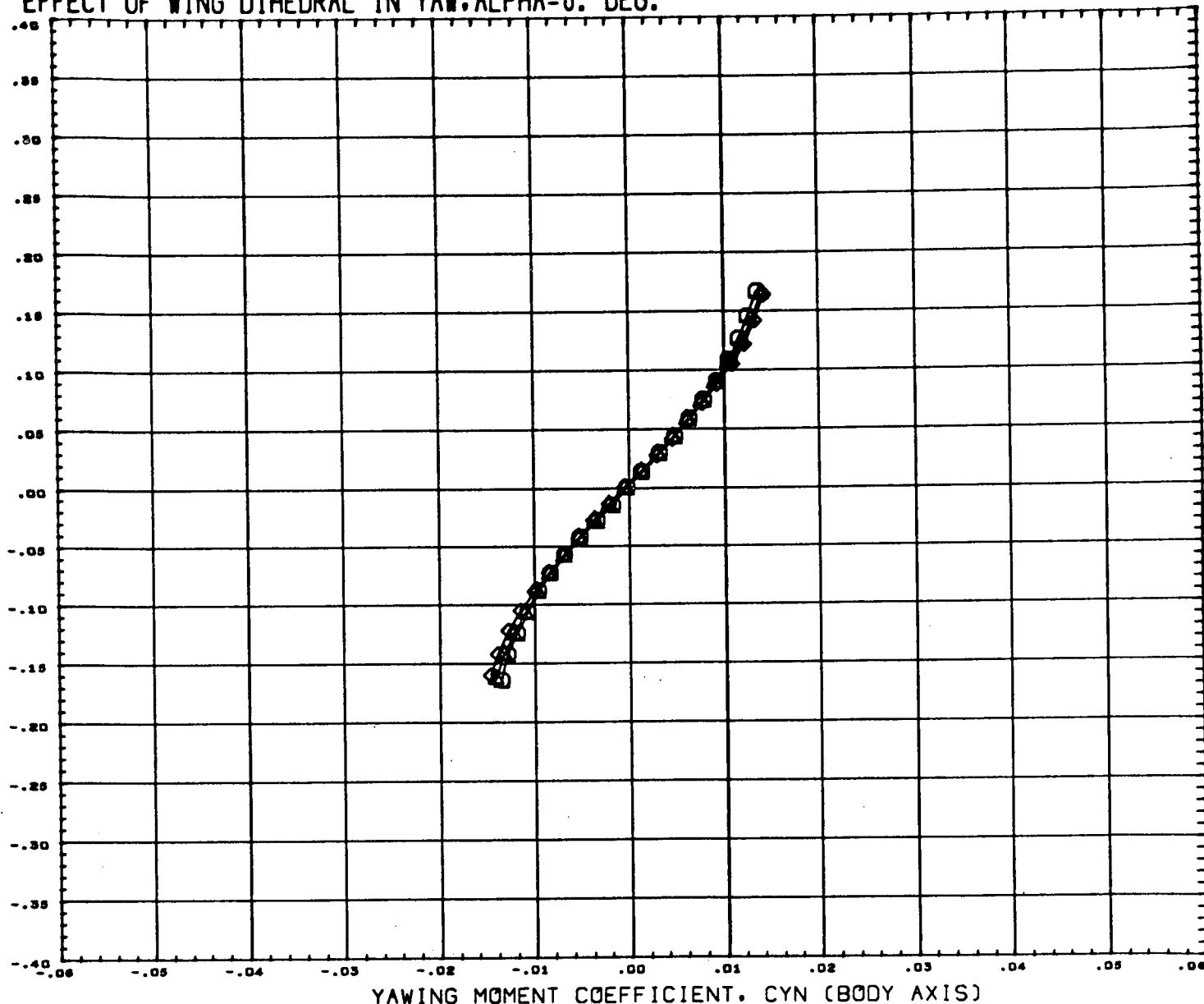
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 BREF 9.6520 INCHES
 XMRP 7.6210 INCHES
 YMRP 0.0000 INCHES
 ZMRP 1.5870 INCHES
 SCALE 0.4348 PERCNT

MACH 8.120

PAGE 116

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=0. DEG.

LATERAL FORCE COEFFICIENT, CY



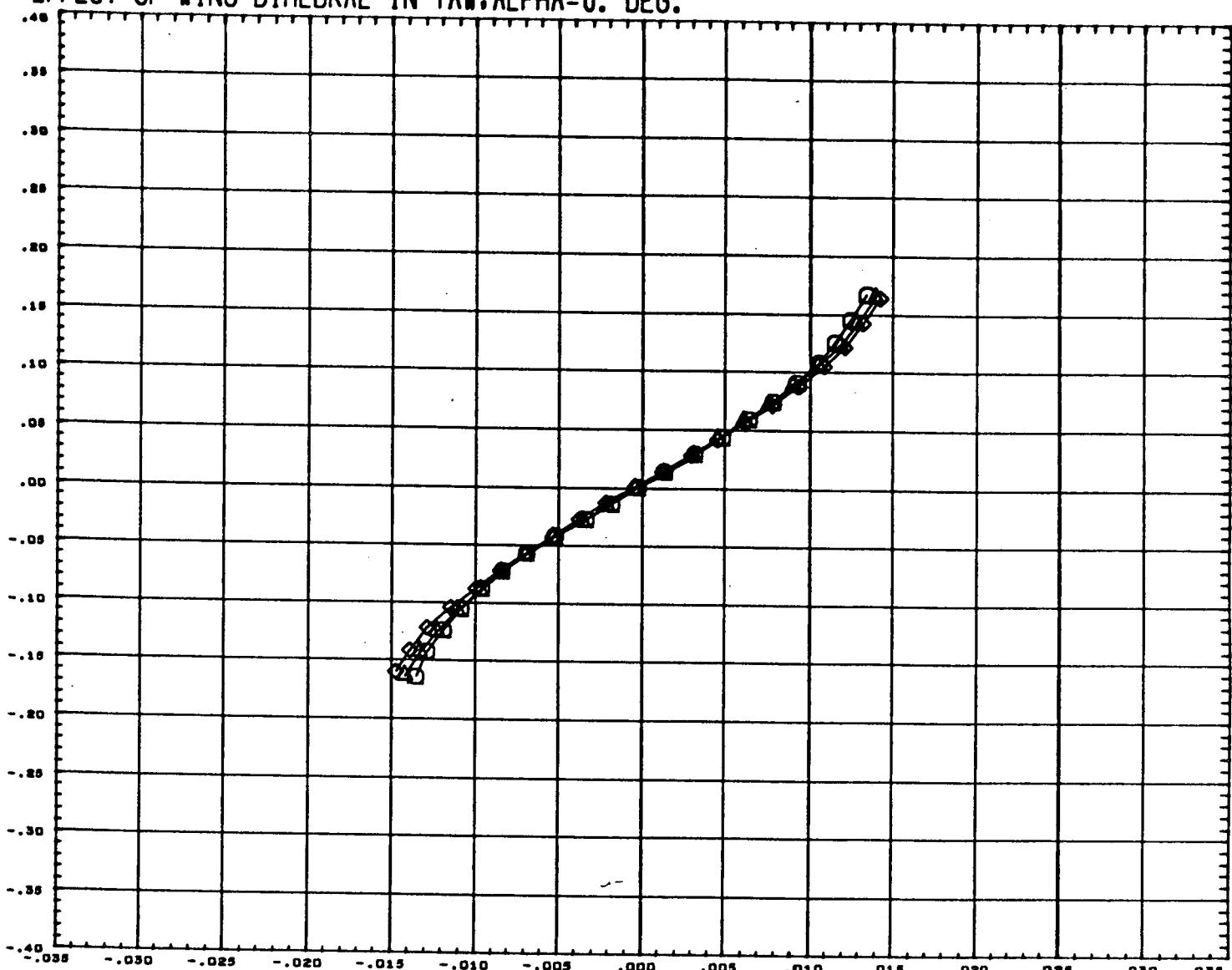
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(FCX374)	GAC HST-020 TBC H-32 BOOSTER B8W6H4V3	0.000	0.000	-15.000	LREF 1.4680 INCHES
(FCX384)	GAC HST-020 TBC H-32 BOOSTER B8W7H4V3	0.000	0.000	-15.000	BREF 9.6520 INCHES

MACH 6.120

PAGE 117

EFFECT OF WING DIHEDRAL IN YAW, ALPHA=0. DEG.

LATERAL FORCE COEFFICIENT. CY



YAWING MOMENT COEFFICIENT. CLN (STABILITY AXIS)

DATA SET SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	ELEVTR	MTAIL	REFERENCE INFORMATION
(FCX224)	Q	GAC HST-020	TBC H-32 BOOSTER	B8W4H4V3	0.000	-15.000	SREF 13.3440 SG.IN.
(FCX374)	Q	GAC HST-020	TBC H-32 BOOSTER	B8W6H4V3	0.000	0.000 -15.000	LREF 1.4660 INCHES
(FCX384)	Diamond	GAC HST-020	TBC H-32 BOOSTER	B8W7H4V3	0.000	0.000 -15.000	BREF 9.6520 INCHES
							XMRP 7.8210 INCHES
							YMRP 0.0000 INCHES
							ZMRP 1.5670 INCHES
							SCALE 0.4346 PERCNT

MACH 0.120